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Distance learning in higher education

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Distance Learning in Higher Education

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ABSTRACT

This study aims at defining the concept of Distance Learning which offers prospects of technological and pedagogical enhancement for the current educational system.

The tools provided in the field of Distance Learning are mainly Computer-Mediated Communication (CMC) techniques which seem best suited for the educational system in Belgium. We chose to apply Computer Conferencing (CC), which represents a particular application of CMC, in order to support the learning process and realize an increased collaboration between students as well as a more efficient interaction with teachers.

keywords: Distance Learning, Open Learning, Computer-Mediated Communication, Collaborative Learning, Computer Conferencing

RÉSUMÉ

Ce travail a pour but de définir le concept d'Apprentissage à Distance, qui en soi offre des possibilités de soutien à l'enseignement, tant du point de vue technologique que du point de vue pédagogique. Les moyens qui sont mis à disposition de l'Apprentissage à Distance sont principalement des techniques de Communication Assistée par Ordinateur (CAO), qui s'avèrent plus adaptées au système d'enseignement actuel en Belgique. La Conférence Electronique est une des applications particulières de CAO que nous avons choisie afin de pouvoir réaliser une meilleure collaboration entre les étudiants dans le processus d'apprentissage et une interaction plus efficace avec les enseignants.

mots-clés : Apprentissage à Distance, Enseignement Ouvert, Communication Assistée par Ordinateur, Conférence Electronique, Apprentissage Collaboratif.

1. INTRODUCTION

Before introducing the reader to what 'Distance Learning' is all about, we just wish to detail what particular circumstances were involved in all our choices related to our study. The determination for writing a thesis in this domain emerged during our training period at Virginia Polytechnic Institute and State University (VPI&SU), Blacksburg - US.

We attended a few classes where it was particularly interesting to see how computers were used at Virginia Tech to support and enhance the learning process of a student inside the computer science department. The courses offered made use of Distance Learning methods which made us aware of a potential beneficial use at our own university back in Belgium. By the time, the idea of creating an on-line course for the 'Facultés Universitaires Notre-Dame de la Paix' (FUNDP) came to us. We still ignored what the design of this on-line course should look like but definitely our interest in Distance Learning was awoken.

Another important factor which influenced our attitudes towards our work was the aspect of communication.

Distance Learning always implies some form of communication. One only has to consider the importance of 'feedback' in a Distance Learning environment to motivate a learner for continuing his learning experience. In this respect, we were learners too and had to communicate a lot with other people to make us advance in our research studies.

Communication took place at Virginia Tech under the form of face-to-face meetings with teachers but e-mail and telephone were also facilities that most of the time helped us to overcome the barriers of time and location. It was very challenging for us in the beginning to contact people and ask them if they were willing to help us in our research.

We think that the actual fact of communicating with other people was a very positive experience and strongly influenced our attitudes towards studying in a different environment. Being back in Belgium, it became necessary for us to evaluate and understand everything we had seen and experienced during the past couple of months. Fortunately, our advisor as well as the staff from the department of technology and education (FUNDP) gave us some valuable guidance for our thesis and contributed a lot in motivating us for realizing our own ideas.

We have to admit that Distance Learning is a very large field of study which has the potential of adding some value to our current educational system. It is a domain that we learned to appreciate and it would be very rewarding for us to see that our studies contribute to future studies or even to some implementation of Distance Learning facilities at our own university of Namur.

Our thesis « Distance Learning in Higher Education » is written for exploring the possible benefits that this type of learning may provide to the 'Facultés Universitaires Notre-Dame de la Paix'.

This research approaches the topic in its first chapter by explaining what « Distance Learning » is from a theoretical point of view. We therefore try to situate the main concepts and provide some models relevant to this kind of learning. Other related forms of learning (i.e. Open Learning and Customized Education) are considered so that everyone can grasp the complexity behind the concept.

We analyze some important quality criteria inside the field of « Distance Learning » before eventually coming up with particularly interesting applications that satisfy more or less this criteria¹ (technical and educational requirements, as well as human factors).

¹ Cfr. section 3.2.1. Criteria for choosing Distance Learning applications

While developing our theoretical part, our interest focuses on Computer-Mediated Communication (CMC). One of the most important reasons why we chose CMC is that this technology best suits our current educational system. This results in the construction of a more practical part, which is meant to apply the Distance Learning theory by setting up a CMC asynchronous conference for the Namur students at the computer science department. This project lead us to review our knowledge for designing and programming interactive HTML pages and making use of the Perl Unix scripting language.

The design of the conference is basically done by considering two aspects : a pedagogical and an operational one. This implies some increased flexibility during the design phase and gives us the opportunity to confront both aspects of designing an on-line course.

Previous to realizing the conference, we develop the theory behind Computer Conferencing to guarantee our understanding of the learning process when using this form of communication. It has to be stressed that our conference is still a simulation, due mainly to serious time constraints. Actually, the content of our on-line forum deals with the field of « Ethics of Computing ». However, any other topic could have be appropriate too. The problems emerging during the actual conference may help to get a deeper understanding of classroom dynamics and to see what particular factors have to be improved before considering the use at our department. These problems are mainly of a technological nature but human factors also catch our attention.

The results of our conference simulation are developed in the evaluation part. Our main conclusions range from the extreme importance of motivation and feedback for the learners, to the necessity of developing a human-computer interface particularly adapted to the needs of the conference participants.

Our thoughts converge to the vision that such a conference can be effectively realized in the future to support a given course.

As our evaluation questionnaires show that students are interested in having some form of on-line courses, we have to stress the fact that this is only considered if the course comes as a form of support and does not replace the actual course. CMC is seen as a complementary means of education but not for replacing the teachers. In the light of these comments, we do suggest the future use of on-line distance learning facilities.

2. MAIN CONCEPTS INVOLVED IN DISTANCE LEARNING

2.1 EXPLAINING OUR THEORETICAL STUDY

Due to the complexity of the topic, we will first outline how the concept of Distance Learning has to be approached in order to guarantee a good understanding. Our study aims at providing a model of the Distance Learning concept. We cannot pretend to detain the theory of Distance Learning and therefore, it is only possible to propose a model that reflects our vision of the concept.

In general, our study aims at clarifying the following questions which frequently emerge when people are confronted with the concept of Distance Learning for the first time.

- What is the field of Distance Learning ?
- What elements are related to Distance Learning ?
- What are the critical issues in Distance Learning ?
- How to select appropriate Distance Learning Applications ?

We think that a good strategy to approach the concept is to start with providing a general framework which may serve as a basis for understanding the relationships between Distance Learning and closely related learning methods (i.e. Open Learning and Customized Education).

It would be unacceptable not to mention those methods because they overlap with the concept of Distance Learning and hence establish some kind of relationship.

After these preliminary explanations, we assume that the reader has acquired enough knowledge about the field of Distance Learning to be able to face some critical issues. The main concerns that need to be analyzed are:

- Academic quality
- Cost of technology and support
- Training and development
- Technology availability
- Coordination and collaboration
- Out-of-class activities
- Human-computer interaction

Based on these issues, our following reflections will provide some important criteria for selecting the appropriate Distance Learning applications. These criteria may then be related to the characteristics of some applications that are commonly used nowadays.

Eventually, we will effectively present some Distance Learning applications so that everyone may understand the relation between our selection criteria and the applications that are presently available.

We conclude our study with some advantages and disadvantages in Distance Learning, only to present a general conclusion right at the end.

2.2 THE GENERAL LEARNING FRAMEWORK

The general learning framework consists of two axes (see figure 2.1). A horizontal one which defines the location (Face-to-Face or learning at a distance). The vertical axis specifies whether the learning takes place in an academic environment or whether it can be considered as a form of Open Learning (N.B. the concept of 'Open Learning' will be explained later on).

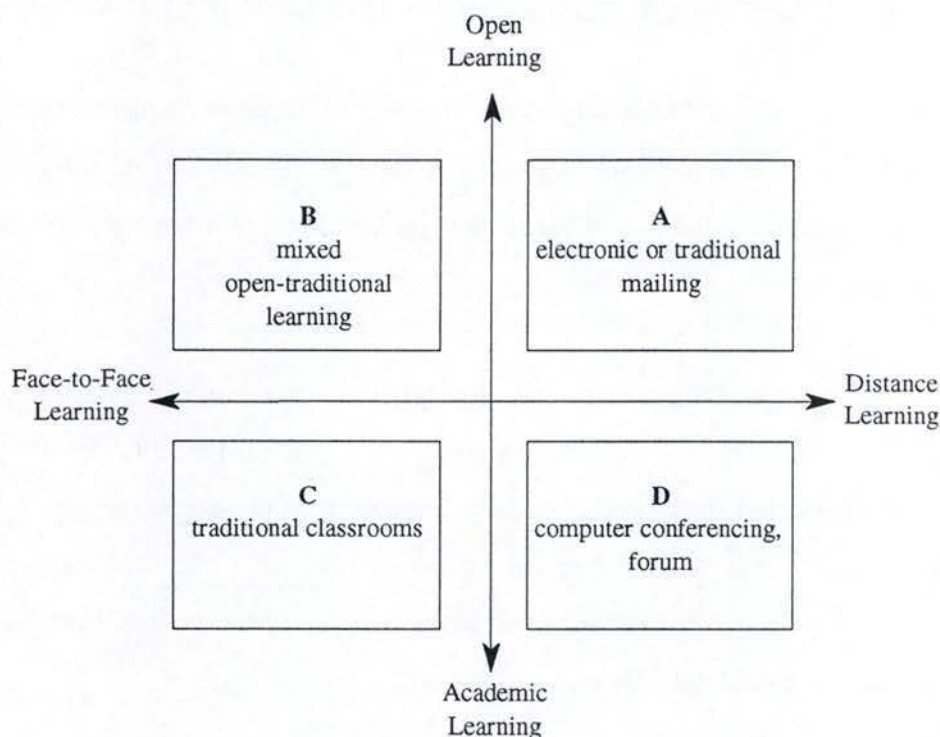


figure 2.1 General Learning Framework

Open learning at a distance (A) is a very frequent type involving Distance Learning. It usually takes place by using some kind of mailing system (i.e. electronic or traditional mailing).

If we consider an academic learning that is done at a distance (D), we have to realize that Computer Conferencing techniques are most commonly used. Because of its importance nowadays, we will explain the concept of Computer Conferencing in a separate chapter which comes right after this theoretical study about Distance Learning.

The academic learning at a face-to-face level (C) does not need any explanation since it is the traditional form of classroom learning which defines our current educational system.

Finally, the unusual type of Open Learning at face-to-face level (B) does not seem to appear very often, hence we are unable to give a specific example.

Although this framework does not appear to be very complex, it is clear that we now have to define what 'Distance Learning' and 'Open Learning' are in particular. We will conclude our approach towards all the different learning methods by detailing the horizontal axis of our general learning framework. This means that we will confront Distance Learning and Face-to-Face Learning, which leads us to the introduction of the concept of Collaborative Learning.

2.3 EXPLANATION OF THE DISTANCE LEARNING (I.E. DISTANCE EDUCATION) CONCEPT

Distance education in contrast with the traditional classroom or campus-based education, is characterized by a clear separation in space and time of the majority of teaching and learning activities. When we talk about education, we think at the same time about teaching and the learning process.

Teaching is to a large degree mediated through various technologies (print, audio, video, broadcasting, computers) and learning generally takes place on an individual or collaborative basis through supported study in the student's home or workplace. Learning is realized while the learner is remote from the teacher - often with the help of pre-recorded, packaged learning materials. The learners may be separated from their teachers in time and space, but their learning is still being guided by them.

The quality of the teaching materials, as well as the level and variety of support for independent study, obviously depend on the nature and resources of the institution or organization, responsible for a given program and the available communications infrastructure.

Different facts are highlighted within the key concepts used to define flexible and Distance Learning :

1. *Openness* in terms of meeting changing and differentiated learning needs.
2. *Flexibility* in terms of adaptation to the individual needs and learning modes and providing full interactive facilities with tutors or other learners.
3. *Decentralization* both in terms of reaching people in remote areas, and of unimpeded access to study facilities at a distance.
4. *Multimedia training*, a definition based on the prevalent instruments and techniques.

Our introduction defines from a general point of view what Distance Learning actually can represent. We made abstraction of Flexible Learning because we thought it was obvious that in a Distance Education system, learning must be more than flexible to be realized, because of

time and place independence, mediation, etc.,... However, there are certain systems like video-conferencing which for example are time restricting.

Some authors on the opposite make a distinction and they call it « Flexible and Distance Education² »:

« Flexible Learning is enabling learners to learn when they want (frequency, time, duration), how they want (modes of learning), and what they want (that is, learners can define what constitutes learning to them). These flexible learning principles may be applied at a distance. If so then the term Distance Learning is used. »

2.3.1 BASIC CHARACTERISTICS OF DISTANCE LEARNING

Where and when to learn ? New technologies do not aim to be a substitute for the existing facilities, but to complement them. When there is no access to a training center or classroom, learning technologies can provide access to learning. This may be the case in remote areas, or in domains of knowledge where the expertise is scarce and concentrated in major urban centers. When the technologies are available at the training center or in the classroom, they can complement the teacher, but in any case substitute him.

What to learn ? The new learning environment should be open and also interact with a constantly developing technological, educational and business world. This requires a new learning paradigm in which learning is brought out of its embedded position in « education » and seen as integrated with everyday events.

New developments in information or telecommunications technologies open new methodological and research possibilities of studying processes such as group learning, collaborative learning, exploratory learning, and active « learning-by-doing » (with or without technological means).

How to learn ? Distance Learning allows the implementation of different technologies ranging from the traditional one-to-one teaching approach through educational television and

² Van Den Brande Lieve, *Flexible and Distance Learning*, ECSE, Luxembourg, 1993, ISBN 0-471-93015-6.

broadcasting of specialized courses. We can also have tele-feedback with a one-to-one learning model, where the tutor is fostered through a computer, making use of computer-based communication, simulations, CD-I³, hypertext and hypermedia tools. Besides, the tutor may be present at a distance through audio- and/or video-conferencing.

This question will be approached in a more detailed way in the section 3.2 (Distance Learning Applications). Before shifting to the presentation of related learning methods, we will have a look at Distance Learning in Europe and in the United States.

2.3.2 AMERICAN VERSUS EUROPEAN DISTANCE EDUCATION

The US government has little jurisdiction in educational matters and plays almost no role in the development of Distance Education. The provincial and state governments, have the authority in educational matters but usually leave Distance Education initiatives to existing institutions.

Considering this background, the distinguishable feature of Distance Education in the United States is very diversified. Institutional free enterprise has given rise to hundreds of programs serving an array of objectives and using various technologies. Education in the USA has consistently made extensive use of information technology. While use and experimentation tend to be fragmented, the overall scale of use is greater than in any other country. Audio, video, remote graphics and Computer Conferencing techniques are widely used in many universities and a large number of corporations. An interesting feature of American education is the extensive use of satellites.

In the USA, the training and retraining of the adult workforce, as well as improvement of the quality of education in schools, has been the major answer to skill shortages. The US-government has recently completed wide-ranging reviews of their school curricula. In each case, the reviews have emphasized the need for greater flexibility and autonomy. In short, the US Distance Learning has become a professional market which forms the cornerstone for a competitive position in industry. The United States are experimenting and developing

³ « Compact Disc-Interactive is a consumer electronics format that uses the optical disc in combination with a computer to provide a system that delivers music, graphics, text, animation, and video in the living room. » Compact Disc-Interactive, <http://cui.unige.ch/OSG/MultimediaInfo/Info/cd.html> , April 1997.

considerable experience with new learner technology. This represents the main difference between Europe and the United States.

In Europe, the market for Distance Learning is less mature. But several technology-based educational and training initiatives and networks are emerging and becoming effective. The market for training through technologies is at present small, immature and fragmented, which is due to the current relationship between supply and demand.

The Distance Learning and training systems differ a lot between the various European countries, whereas inside the United States they remain quite homogenous. The continuing training « system » in Europe is not , in fact, a system : it is a mixture of market-oriented elements and uncoordinated, isolated training actions which are very difficult to compare on a national or regional level.

A short Distance Education history in Europe⁴

Governments in Europe have however a long tradition of involvement in Distance Education networks, initially as a means for reaching geographically isolated groups. It is said that the history of Distance Education goes back to the correspondence courses in shorthand organized by Isaac Pitman when the first regular postal services were established in Great Britain in 1840. The first real correspondence course institution was the Toussaint and Langenscheidt Institute, founded in Berlin in 1856 for teaching languages. From then on, there has been a steady growth in the development of correspondence-course provision, often associated with occasional Face-to-Face teaching sessions in a wide range of countries, both in the public and private sectors. However, such provision had often been regarded as a second-best alternative to conventional education.

The last twenty years or so, numerous factors have contributed to a major change in the status of Distance Education as an appropriate and effective mechanism for adults education and training. Economic changes have radically altered the skills required by enterprises. This meant

⁴ Van Den Brande Lieve, *Flexible and Distance Learning*, op.cit.

rethinking the objectives of, in particular, the initial educational system, and the need to retrain the unemployed.

The concept of Distance Learning does not have universal meaning because of the diversity between the various distance-education models adopted in different countries.

Having seen some general features about Distance Learning, we may now go over to explain the different axes of our general learning framework.

2.3.3 DISTANCE LEARNING IN AN ACADEMIC ENVIRONMENT

We can differentiate two extremes within the variety of the Distance Education courses at university level.

The first extreme is that of campus-based institutions, where external students are provided with copies from the reading lists and lecture notes. In addition, these students may be sent tapes of the lectures and the tutoring function is guaranteed by correspondence, telephone or electronic-mail.

The second extreme consists in the example of the Open British University, where the teaching is made completely at distance. Likewise , Athabasca University in Alberta which has around 10.000 full time distance learners.

2.3.4 DISTANCE LEARNING AND CLOSELY RELATED LEARNING METHODS

As a matter of fact, all the references we consulted about Open Learning agreed upon the point of view that Open Learning always implies some sort of Distance Learning. This statement is illustrated by the figure 2.2 which shows the intersection between both concepts.

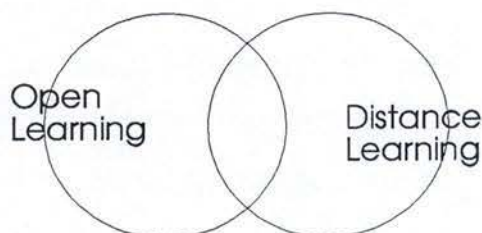


figure 2.2 Open and Distance Learning

Another important form of learning that we try to explain is actually the « Customized Education » method, which can be considered as very special form of learning. In particular, it was Dr. Bernadette Charlier who suggested that this form of learning in modern pedagogy needs to be considered too, because its importance is stressed by the fact that it makes use of Open Learning and Distance Learning to fit the special needs of a particular group of students. Therefore, we will explain the latter form of learning in a separate paragraph.

2.4 DISTANCE LEARNING AND OPEN LEARNING

According to D.Rowntree⁵, the concept of Open Learning implies two fundamental ideas. Open learning is basically a philosophy, that means a set of beliefs about teaching and learning. Besides these beliefs there is a certain amount of methods defining all the possible ways in which this form of learning can be practiced.

It is very important to realize that philosophy and methods do not necessarily have to be linked and that one can apply the methods of Open Learning without even knowing about the philosophy of opening up the learning process to a large group of people and giving them the possibility to control their learning.

2.4.1 OPEN LEARNING - THE PHILOSOPHY

In his book '*Exploring Open and Distance Learning*' D.Rowntree illustrates the concept of Open Learning by giving some definitions from different authors. Based on these definitions, we propose the following graph which tries to clarify what the philosophy is all about.

⁵ Rowntree Derek, *Exploring Open and Distance Learning*, Kagon Page, 1992, ISBN 0-7494-08138.

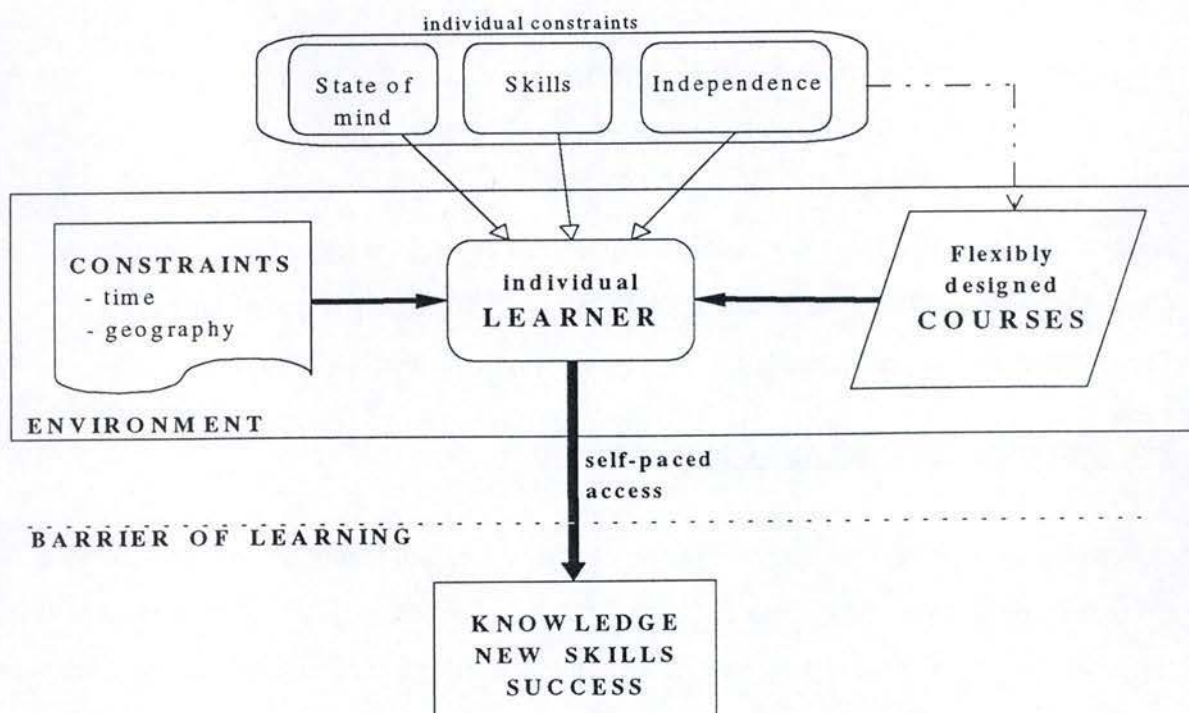


figure 2.3 Exploring Open and Distance Learning

Taken as an individual, a learner brings along a certain state of mind which makes him more or less open to the world surrounding him. A person must have a positive attitude towards acquiring new knowledge and therefore he must be interested in using the Open Learning philosophy to engage into a process of autonomous learning, whatever might be the reason for his learning and developing new skills.

Every person has a certain amount of skills, talents and knowledge which is helpful in everyday life. But these skills also may be used to develop new skills which might once again positively influence the state of mind of that same person. Throughout all these considerations, we see that a learner is more or less independent towards the acquisition of new knowledge. If this same person is less independent, his environment might pressure him towards learning and in this way change the approach and state of mind towards the learning process. Open learning therefore always needs more or less willingness from that same person to engage into an autonomous learning process.

The learning environment of an individual learner consists of the main constraints of time and geographical location. These constraints introduce to the concept of distance which we will

explain later on to illustrate the difference between the notions of 'Open Learning' and 'Distance Learning'.

However, to be a success, the learning process needs an environment where the individual learner may find flexibly designed courses to satisfy his desire to study and access to new knowledge. Flexibly designed courses are based on everyone's individual constraints but do also implement the main constraints of time and distance to guide the learner in his experience of passing the barrier of learning.

Self-paced learning therefore helps the learner to go beyond this barrier and reach the target of knowledge, new skills and success (the mission of every learning!).

All these considerations lead to openness in a learning process, but as D.Rowntree states, we always have to ask ourselves if our Open Learning system is open enough.

« No learning system or programme is ever fully open. Nor is any fully closed. Openness is an ideal for which we must keep striving rather than a state we can expect to attain. »

So far we have seen the philosophy of Open Learning. But how can we relate the method of Open Learning to the philosophy ?

2.4.2 OPEN LEARNING - THE METHOD

The methods for applying Open Learning are most of the time materialized by packages which can be constructed using different media. Printed documents, television or computer « courseware » are frequently in use for such packages. Helping the learner to learn more easily is a fundamental idea of these packages, but where can we situate the openness in these packages.

D. Rowntree thinks that the mere fact of giving more people access to a learning opportunity without having to employ more teachers nearly satisfies to the criteria of Open Learning. Combining this idea to the use of particular media thought to help different learner profiles and by taking advantage of the concept of Distance Learning (e.g. time and location), the learner

achieves Open Learning by having to show more responsibility for his own studying (the idea of self-paced learning is important here).

The quality of these packages differs a lot, depending on whether they are used in an academic environment or simply at home. Packages which need a certain amount of support might be more effective as opposed to « stand-alone » packages because the former ones are most of the time more responsive to the needs of the learner.

It seems important to note that D.Rowntree is deeply convinced that packages do not suffice to the learner. His view may be linked to the difference in quality of the multiple packages available and that it is important to realize that there is always a need for some kind of support from a teacher or a tutor.

It appears as if learners always need to have some sort of reassurance to keep on learning and be enough motivated to advance in their learning experience. This of course brings in the importance of the human factor. However, everyone's representation of support is not linked to a kind of human factor.

Some people are already reassured when the package they use is well structured and does not lead to confusion but most of the time learners need some feedback on their progress and therefore included features like newsletters or learning center notice-boards are very helpful in providing some kind of support.

If packages are the most common form of practicing Open Learning and if we are in a university environment, how shall we proceed to get a package ?

The first idea is obviously to develop your own package. Considering that if we design our own package we can be sure to meet our own needs and requirements is a strong argument in favor of this approach. Furthermore, updating our own package will not be too costly or difficult, having regard to the fact that modifications are always what makes a product really expensive. Beside any irrational considerations for developing our own package, one has to be

aware of the cost of employing our own staff for the design. Deadlines and quality standards might be a critical aspect and a strong argument against developing our own package.

A project of this size needs a good organization and if we don't have the needed infrastructure for such an 'enterprise', it should be considered that it might be too risky engaging into such a project.

Taking a decision always needs to consider all the options and alternatives. In this context, the fact of simply taking an existing package seems very wise. But will it meet our requirements? Most of the time this constraint is not met and a possible solution would be to do some sort of « wrapping-up » of the existing package. Since adapting an existing one is fairly difficult and might also be quite expensive, one should consider using different other tools beside this existing package and adding some sort of tutoring or support.

These reflections only try to show the difficult choice before using a package and we should always keep in mind what the basic objective of the package really is before taking any decision.

To conclude this decisional problem , we can briefly mention what Lewis & Paine⁶ think about the problem of adopting the usage of a package, although it was not applied to Distance Learning packages as such :

« The arguments for choosing one of the other options are thus compelling. Time, money and effort should be saved. The end product is more likely to be good. The energies of teachers and trainers can be deployed in areas where they are more likely to bear fruit, for example in devising flexible support and management systems. »

Given the principles of Open Learning, let us approach the concept of Distance Learning relating it to the openness we mentioned before.

⁶ Rowntree Derek, 'Exploring Open and Distance Learning', *op.cit.*, p.148.

D. Rowntree has made a couple of remarks that might make it interesting to have a closer look at. According to this author, Open Learning always implies some degree of Distance Learning. But how does he define the concept of Distance Learning ?

« Distance learning is learning while at a distance from ones teacher - usually with the help of pre-recorded, packaged learning materials. The learners are separated from their teachers in time and space but are still being guided by them. »

2.4.3 OPEN LEARNING COMPARED TO DISTANCE LEARNING

It is important to note that we already said that Open Learning always covers Distance Learning aspects, but the reverse statement is not true: most of the time Distance Learning does not involve much openness if we do not consider the concepts of time, space and pace of learning.

From what we previously stated about Open Learning, we can now affirm that the philosophy of Open Learning is to provide better access to learning and provide the control over the learning process. If the method of Open Learning only can be implemented using the features of Distance Learning, it becomes clear that Distance Learning is tightly linked to Open Learning but they do not have to go together.

The frontier between Distance Learning and Open Learning is not clearly traced. Distance learning does not have to be open, although it happens that most of the time it is. To compare Distance Learning to Open Learning always means evaluating the degree of openness in relation to the kind of distance.

To illustrate the difference between both types of learning, let us have a look at the way in which F.Lata & S.Stoppolini⁷ see those kinds of learning. In their view, Distance Learning in the particular case of computer-mediated-communication is mainly for subjects who, for logistic or economic reasons of work commitments, have no alternative other than home-study.

⁷ Seidel Robert J., Chatelier Paul R., *Learning without Boundaries*, Plenum Press, New York and London, 1994, ISBN 0-306-44896-3.

Open Learning is seen as a form of Distance Learning with computer-mediated-communication for people who aim for the attainment of ability, independent of the need for qualifications.

Considering all the different definitions of both learning types, we have to admit that there is no fixed frontier between Open Learning and Distance Learning. What type of learning best matches does always depend on the needs of the learner and on the availability of teachers, tutors and supporting media and material.

2.4.4 CUSTOMIZED EDUCATION⁸

Satisfying the needs of the students is a major goal of this form of education. Any course designed according to this philosophy and aiming at providing a more efficient educational system requires a homogenous sample of students who have certain fundamental knowledge which are required. Furthermore, any tools of Distance Learning (papers, radio, video, computers) can only be justified when considering a real desire from the part of the students to acquire a qualification non-accessible on a traditional basis. This desire to get a better education represents a prerequisite for any kind of customized education.

Basically, there are 3 forms of customized education. These three forms can be given separately but cannot be considered independent from each other:

- 1) On-site education, where the interactive relation with the teacher can be at a distance
- 2) Mediated education, which includes a temporal distance between teacher and learner
- 3) Distance Education, which necessarily is a form of mediated education

Nearly every educational activity can be mediated by introducing a temporal distance between the learner and the teacher, but the problem of the practical assignments still remains. Class assignments that have to be done at the lab can only be simulated at home to a certain degree.

⁸ Ministère de l'Enseignement Supérieur et de la Recherche, « Vers un enseignement supérieur sur mesure », Direction générale des enseignements supérieurs, Paris, 1993, p. 5-43.

Nevertheless, students need at some point to get in touch with the mediator to either demonstrate their actual work or to show how they deal with a certain assignment (i.e. practical work always has to be 'realized' and not stay at the level of simulation).

Considering the last form of customized education ('Distance Education'), there is a possible radical use of the concept of distance. The function of the teacher could be completely 'eliminated' and knowledge would be available throughout a network of digital libraries. The work to be done by the learner should then consist in information research and retrieval but also include a more productive activity (e.g. writing an essay, realizing a presentation, a project,...etc.). In this case, the role of the teacher would be limited to verifying if the work is correctly done.

This form of evaluation done by the teacher can also be mediated by making use of multiple-choice questionnaires, available on a network⁹. It has to be noted that this form of evaluation exists at Virginia Polytechnic Institute and State University, where students for some courses have to answer questions on-line and depending on their level of knowledge get increasingly more difficult questions from a system actually called 'Quizit', on which we shall come later (see section 3.1.2.6 Out of class activities).

There are 4 major types of action for developing a customized form of education:

- producing the necessary resources for self-study courses (by using any type of media available)
- creation at university level of a network linking different sites that are centers for resources
- interactive distribution of activities through television
- diffusion of courses through radio or television

One of the reasons for supporting these types of action is given by the need for the customized education to further open-up a university for permanent education. There is a real need to offer programs that help people in professional life to attend courses, having regard to a limited time

⁹ which means that the questions are available on-line

schedule. Getting the best possible qualifications without being able to spend full-time on attending classes provides a strong reason for developing customized education programs.

Who are the actors involved ?

Tutors and mentors represent the first category of people which are respectively in charge of providing the competence for any course content and guaranteeing the location of the needed resources. These educational resources are taken in charge by editors and distributors. Authors and implementors are then specialized for producing the educational resources with regard to the type of media used. Integrators could be responsible for applying the resources to field of multimedia.

There is a need for research personnel that looks after the work that has to be done on the pedagogical, sociological but also technological level. Informational managers could provide some help in screening future technologies that can be used in customized education.

All these people are meant to contribute their experience to the customized education model and they constitute a sort of human resources infrastructure. However, it is more difficult to locate the learner inside this model and therefore the status of a student (at a distance) has to be clarified before applying the philosophy of customized education.

It is important to realize that customized education implies some form of cooperation. Rationalizing an educational system requires an institute to get all sorts of departments to work together (these departments are tele-teaching, centers of resources, audio-visual services, libraries, permanent education services, local network administrators,...). The need for cooperation can also be found when opposing our main concepts in the general learning framework. In the next paragraph, we will show the importance of collaboration and cooperation in education.

2.5 DISTANCE LEARNING AS OPPOSED TO FACE-TO-FACE LEARNING

Many teachers feel that the opportunities offered by Distance Learning outweigh the obstacles. In fact, instructors often comment that the focused preparation required by distance teaching improves their overall teaching and empathy for their students.

How can we represent Distance Education in comparison with Face-to-Face Education or Campus-Based Education?

As shown in figure 2.4., Distance Education fills in the existing gap in Face-to-Face Education.

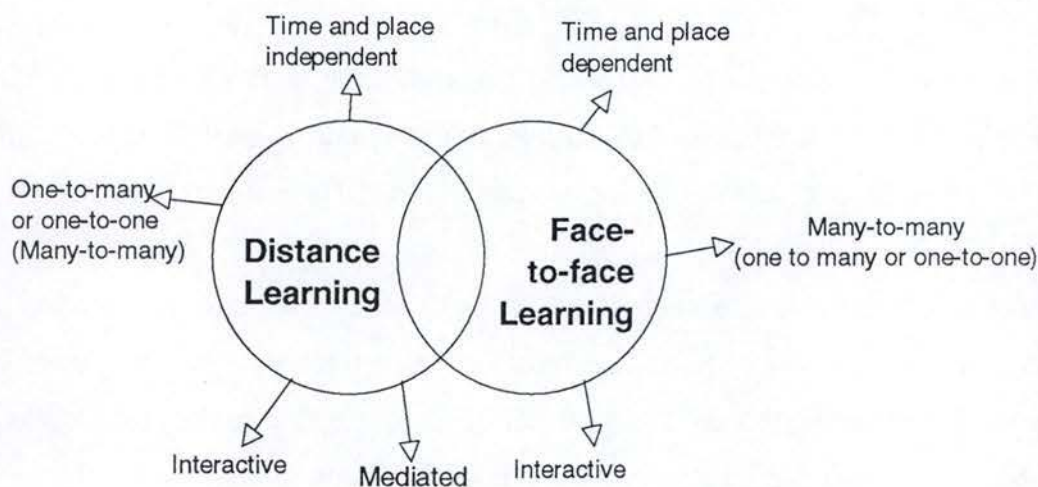


figure 2.4 Distance Education and Face-to-Face Education

Face-to-Face Education facilitates many-to-many interaction, but it is time and place dependent. However, Distance Education eliminates this problem. Some years ago, Distance Education facilitated only one-to-many or one-to-one interaction, which was a big inconvenient, because of motivation and feelings of emptiness of distance learners. With the emergence of on-line education such as Computer Conferencing, Distance Education was also enriched with a many-to-many interaction facility.

We think that on-line education best fits our aim of enhancing the current pedagogical system. The introduction of the concept of collaboration will lead us to focus on a learning that increasingly makes use of computer technology and computer-based learning techniques.

2.5.1 DISTANCE LEARNING - A DOMAIN FOR COLLABORATIVE LEARNING

Collaborative or group learning in the traditional Face-to-Face classroom refers to a set of instructional methods in which students are encouraged or required to work together on academic tasks. Collaborative Learning views the learner as an active participant in the learning process, involved in constructing knowledge through a process of discussion and interaction with learning peers and experts.

The on-line environment is particularly appropriate for collaborative learning approaches which emphasize group interaction. Much more than a technical device for exchanging information, Computer Conferencing facilitates the sharing of knowledge and understanding among members of a group who are not working together at the same time or place. Nevertheless, if the Computer Conferencing system offers potential for active group participation and interaction, it does not guarantee it.

According to Linda Harasim (Ontario Institute for Studies in Education, Canada)¹⁰, « *While some reported cases of on-line education achieved high rates of learner participation and group interaction, other researchers have found that achieving an active membership (in which members are actively writing as well as reading notes) has been a problem in on-line educational activities.* ». This problem may be managed by providing good feedback to the learner and stimulating frequent interaction between mediator and learner.

Two types of learning may be identified in a learning environment that aims at cooperation or collaboration. These types are 'Active Learning' and 'Interactive Learning'.

¹⁰ Mason Robin and Kaye Anthony, *Mindweave, Communication, Computers and Distance Education*, Pergamon Press, New York, 1989, ISBN 0-08-037755-6.

2.5.1.1 Active Learning

Active Learning in an on-line environment can be measured by the level or amount of participation, such as the number of conference messages written or the quality and the significance of these messages. In the Active Learning, students actively present ideas and respond to each other's formulations, a process which contributes to facilitate the development of higher levels of understanding. Active participation creates a particularly information-rich environment, providing each student with multiple perspectives on an idea or topic.

2.5.1.2 Interactive Learning

Distance Learning including on-line education systems is not only active but also interactive. Conferencing exchanges in the courses are student-centers, involving dynamic and extensive sharing of information, ideas and opinions among learners. Knowledge-building occurs as students explore issues, examine one another's arguments, agree, disagree and question positions. Collaboration contributes to higher-order learning through cognitive restructuring or conflict resolution, in which new ways of understanding the material emerge as a result of contact with new or different perspectives.

In typical Face-to-Face classroom communication, participation rates are unequal. First the teacher takes up most of the available class time. Class discussion, if and when this occurs, is often characterized by one or two students dominating the discussion with the majority remaining silent. In the on-line courses, generally most of the students are participating and within each group the volume of contribution is relatively equally spread.

Learning activities within Distance Education, including here the on-line environment, are neither time nor place dependent. Time-independence refers to the fact that communication within most Computer Conferencing systems is based upon asynchronous (that is, not real-time) communication. Place-independence refers to the fact that the learners can be at different places, at home, at a library, at another city or state.

The new technologies of on-line video conferencing can impose a dependence on time, due to the distance itself and the availability of the teachers. Time-lag is also a constraint that sometimes makes it very difficult for possible on-line courses between the teacher in one continent and the learner in another.

2.5.2 THE NEED FOR COMPUTER-MEDIATED COMMUNICATION (CMC)

Clearly, our previous comments show that there is a real need for using Computer-Mediated Communication for Distance Learning purposes. To underline this statement, we will now briefly describe the field of CMC and outline what can be achieved by using this particular form of communication.

We must be careful not to use the term either in a too narrow or too broad sense. CMC is clearly more than electronic-mail, but it is also less than all computer applications in distance education and training. Historically, 'communication' in the context of CMC frequently meant 'the use of a telecommunication network', but the concept has been extended to cooperative working, decision making, etc., where the distance element is missing, and the emphasis is on direct human communication augmented by computers. CMC generally includes electronic-mail, Computer Conferencing and on-line databases.

Methods of teaching in Distance Education are beginning to converge and traditional teaching methods are in some instance being abandoned or modified in favor of a resource-based approach, which no longer emphasizes the teacher as the main source of knowledge.

It doesn't mean that CMC will replace teachers, texts, telephone, tuition or residential seminars. For the majority of learners, it will complement their earlier technologies and in doing so, it will vastly enrich the education experience.

Particularly for house-bound or handicapped, CMC may well become the major life-line to interactive learning opportunities. Because this will be the only way for them to better communicate and remain on the same level than other people.

This concludes our general study about learning methods that have to be related to the field of Distance Learning. We will no go over to some more technical aspects of Distance Learning and detail critical issues as well as present some interesting applications that may be used for Distance Education purposes.

3. TECHNICAL ASPECTS IN DISTANCE LEARNING

3.1 CRITICAL ISSUES

3.1.1 APPLICABILITY OF DISTANCE LEARNING

Before discussing actual applications of Distance Learning, we pass through some major elements which are important in the applicability of a Distance Learning project. On the one hand, geography is a major factor as distance implies being separated by more or less space. This may be a problem if differences in time are important or if quick transmission of the data is essential. Video-teleconferencing from the United States to Europe would therefore be quite difficult because of the time separation.

On the other hand, the language is usually considered as being important, but since English is a kind of unofficial standard for the Internet, we really do not see any major difficulty. Nevertheless, it would be a good idea for providing all the Distance Learning tools and information in three of the most common languages (English, French, Spanish). Distance learning facilities also have to be valid in a university environment. This validity is guaranteed as long as the information and courses provided are based on serious research and university studies. All the tools used should be carefully evaluated before considering the actual use of them.

The Distance Learning concept can be useful for universities but it should always remain a complementary tool for the educational system, in order to maintain the quality of the education and to maintain a personal human touch between students and teachers, what we think is a major factor for becoming a complete university trained student.

Obsolescence is the last element that may play a role when considering the implementation of a Distance Learning facility. In our rapidly changing world it might be a major technical preoccupation, since the hardware changes at an ever increasing speed. Apart from this concern, software is updated regularly and one cannot consider running a good Distance Learning project without planning to make use of software maintenance and specific adaptations.

Software should usually adapt to the hardware, but since software developers do not always stick to this policy, extra costs are the result because, sometimes, installing a new version of a program implies installing a new operating system which in return may need specific hardware requirements.

3.1.2 CONCERNS ABOUT DISTANCE LEARNING

Because we have to overcome barriers of distance and time in order to enhance access to people's resources, instructional resources, the costs and technical requirements are, as often if not always, a really important factor.

In general, a cost evaluation is very difficult because most of the mechanisms are being used inside a university environment for calculating Internet connection costs are hidden from the individual faculty member. Besides, all the licensing fees for conferencing software depend on the number of user sites and the type of computers being used.

Introducing more telephone lines, better modems, specialized software does gradually increase the costs of any Distance Learning facility. In the near future, the upcoming and probably most expensive technology will be the ATM (Asynchronous Transfer Mode) networking technology. This will imply parallel transmission of data, audio and digitized video.

Surveys made by the « Pennsylvania Association of Colleges and Universities¹¹ » shows that we have to be concerned with the use of Distance Learning, because there are some factors that can influence the realization of the latter, such as the quality, costs, funding support, institutional and academic integrity, faculty issues, training and development, availability and accessibility of technology, implementation guidelines, collaboration and cooperation. Let us try to summarize some of these factors.

3.1.2.1 Academic Quality

The aim of Distance Learning is to improve the quality of the educational system. But we do not know if Distance Learning can guarantee an improvement of the educational system. Instead of better educational systems, the result can be the opposite of what we are trying to achieve. Institutions that are involved in Distance Learning want assurance that it will provide high quality education with better facilities for new learning experiences. All this does not mean that a poor course can become a good one because of Distance Learning facilities.

3.1.2.2 Cost of Technology and Support

Distance Learning must be based on high quality resources first, i.e. the technology and the support. The cost of those high quality resources can be very important. Hence, many of the smaller institutions will be forced to be far from the realization and implementation of Distance Learning systems.

Another concern is to maintain the technology continually up-to-date. This requires a lot of support, including maintenance personnel and a permanent budget allocated to the maintenance. Developing and delivering the new courses is also one of the concerns that can increase the cost for any implementation of Distance Learning technologies.

¹¹ Pennsylvania Association of Colleges and Universities (PACU) - Distance Education Study Group, *Distance Education in Pennsylvania Higher Education*, PACU, Harrisburg, May 1996.

A solution seems to be the development of some kind of association between different institutions that want to realize Distance Learning, to face the high cost of those resources.

3.1.2.3 Training and Development

A number of institutions, according to the Pennsylvania Association of Colleges and Universities, raised concerns about providing faculty training and development in Distance Learning, as well as providing user training support programs. Concerns ranged from the need to know how to provide these types of training programs to the need to know how to find the money to develop or purchase the training for the faculty and staff.

3.1.2.4 Technology Availability

The availability of the technology to support Distance Learning methodologies, such as having the necessary hardware and software to enable the institutions to make Distance Learning courses possible and to make courses effective, is one of the major concerns. Another concern is to make equitable the accessibility for all the students.

3.1.2.5 Coordination and Collaboration

The lack of coordination between different institutions involved in a Distance Learning system can cause confusion and frustration inside those institutions. Without good coordination between the different institutions, even if we have the available technology, Distance Learning will remain inside one institution or simply will be impossible to be realized.

This means that if the coordination fails, costs will increase a few times more than the real costs. The costs will have a higher increase rate because we will have in addition the real costs of resources used in the coordination, the cost of unused resources, the cost of trying to reestablish coordination etc.,...

Collaboration between several institutions remains also an important factor for Distance Learning. We can affirm that collaboration is one of the main goals of Distance Learning, which allows to share knowledge from one side of the world to the other. In case of a lack of collaboration, the knowledge that we hold will remain unknown for others, and vice-versa.

This doesn't mean that information will be kept non-shared forever, but it will be delayed for a portion of time, i.e. when we receive information, it may already be obsolete.

3.1.2.6 Out of class activities

If we put ourselves into the particular context of a university that is considering the use of Distance Learning facilities, there are activities that come around, like examinations or homework which cannot always be accomplished inside a classroom, even if it is a virtual classroom. This observation requires that all the « out-of-class » activities are designed using the Distance Learning paradigm.

Given the example of the homework, this task could be achieved by a single student using all the resources available (like modems for a connection to the university) or by a group of people meeting in a computer-lab and cooperatively working on their homework or projects. Homework therefore could become computer-mediated, which would imply that the teacher would get a better idea of the progress one single student (or a group of students) is (are) doing, simply by having a closer look at the number of times these people connect to the network in order to do some serious work.

In the same way, examinations could become computer-mediated by creating web-pages that include passwords for more security and have as primary objective the automation of certain exams. These pages should include a 'secure' grading-system and a mechanism that adapts the level of difficulty of the questions in relation to the performance of each single student. As an example, we can consider the « Quizit » system¹². The Quizit is a test system realized via the WWW. Every student participating on those particular courses which contain a Quizit system must have a password. For each chapter, the students get new Quizit questions. In each Quizit system the students first have a series of questions. If they answer with a good percentage of points, they finish with their work, if not they will have supplementary group questions until

¹² Tinoco L., Fox E., Ehrich R., Fuks H., Quizit: An interactive online quiz system for WWW-based instruction, <http://ei.cs.vt.edu/>, November 1996.

they have a certain demanded percentage of points. If they fail again, then the teacher asks them to make an appointment to see what the problems are.

Furthermore, teachers can simplify their educational task and save a lot of time by putting on the World-Wide-Web a list of all the 'Frequently-Asked-Questions'. This improves teaching quality since these kind of questions do not have to be considered during the lessons anymore and the time saved can be used for answering or exploring new interesting questions and ideas that deeply explore the topic of the lesson taught.

Throughout all these computer-mediated activities, one might fear that there is a serious loss of interactivity and personal contact. In fact, as S.Laughton¹³ states in his dissertation, Distance Learning facilities promote human-human communication and do not remove this personal contact. Interactivity is guaranteed by means of teleconferencing or simply by the tutoring of Distance Learning processes. Students get involved into computer-mediated learning processes but still remain tutored by assistants or teachers who provide a personal touch to the Distance Learning. They are not left alone inside their learning experience but followed by these tutors during the whole life-cycle of the Distance Learning experience.

3.1.2.7 Human Computer Interaction

Humans interacting inside a computerized environment tend to react in multiple ways to the constraints the software and also the hardware of such an environment impose upon them. As a matter of fact, the psychological factor plays a very important role when considering the implementation of a large project like that of constructing Distance Learning facilities. People do not adopt in general a neutral point of view when having to deal with computers. The number of different psychological reactions towards Distance Learning is so extensive that one cannot pretend to exhaustively list them.

If one ever experienced the life as a student, it is quite obvious - and unfortunate - that most of them are afraid of raising questions or at least think of it as an annoying task that has to be

¹³ Laughton Stuart Charles, *The design and use of Internet-Mediated Communication Applications in Education: An Ethnographic study*, Virginia Polytechnic Institute and State University, Blacksburg, 1996.

done in order to satisfy the teacher and to show that they are in fact participating during the lessons.

This of course is the usual way of thinking of a student inside a traditional classroom. However, being confronted to a computerized classroom or even virtual classroom, students may find it easier to raise questions via e-mail or inside classrooms, normally used to promote collaborative work. Debating using a Distance Learning facility may in a certain way promote the collaboration of certain students who usually would stay more passive in a traditional classroom.

In contrast to this reaction, there might be a little problem when using facilities like teleconferencing or television. Sitting in front of a camera does not inspire all the people inside a classroom and may in fact decrease their participation to the course. Unless being forced to contribute to the discussion inside the classroom, most of the students will then try hiding and not showing any willingness towards collaboration.

At the very extreme, Distance Learning via computers may even result in a certain kind of technophobia. People then refuse to use the material available, not because they do not want to, but perhaps they may feel like being confronted with something they cannot handle and are afraid of failing or behaving in a wrong way.

Stuart Laughton¹⁴, from a social point of view, thinks that designers should consider Computer-Mediated Communication as a way of human-human communication but notes that there is an existence of a phenomenon called « flaming in electronic discussion » which then defines as ephemerality and lack of tangible reminders of the audience.

Based on all of the previous concerns and critical issues, we put together a list of important criteria that must be considered during the selection of appropriate Distance Learning applications.

¹⁴ Laughton Stuart Charles, *The design and use of Internet-Mediated Communication Applications in Education: An Ethnographic study*, op.cit.

3.2 DISTANCE LEARNING APPLICATIONS

3.2.1 CRITERIA FOR CHOOSING DISTANCE LEARNING APPLICATIONS

The issues identified earlier mainly concern communication, effective and efficient work at a distance, as well as the localization of learning resources. How far complex or constraining a particular learning environment may be, we always have to keep those issues in mind.

Unfortunately, it is very difficult to give some good advice for selecting appropriate applications. An example of guidelines¹⁵ can be found with J.M. Shaeffer and C.W. Farr, who both suggest the following considerations:

1. The media format selected should match the method of instruction.
2. Communication of course content must be clear and specific.
3. If you are utilizing commercially produced media, preview it in its entirety prior to using it.
4. When using commercially produced fixed-paced media (audiotapes, videotapes, filmstrips) consider whether the presentation should be used in its entirety or in segments.
5. Incorporate several means of communicating important information to your students. Varying the means of communication also helps to engage the learners.
6. Include modules to provide students with a class-by-class description of course goals and objectives. Weekly class modules should also contain references for students who need additional information on a given topic.
7. Provide visual representations to guide students through concepts of course topics. Visual representations that can be utilized in the distance learning classroom include still graphic representations, textual information, audio, video, and computer generated displays.

The previous considerations illustrate the level of difficulty for us to give very specific criteria for choosing Distance Learning applications. However, we think that there are three main criteria, incorporating several sub-criteria, that one has to be aware of. The following tree-structure (see

figure 3.1) summarizes our vision of the importance of these selection criteria.

¹⁵ Downs Elizabeth, A Faculty Development Model for Distance Learning Systems, Georgia Southern University, http://www.coe.uh.edu/insite/elec_pub/html1995/112.htm, October 1996.

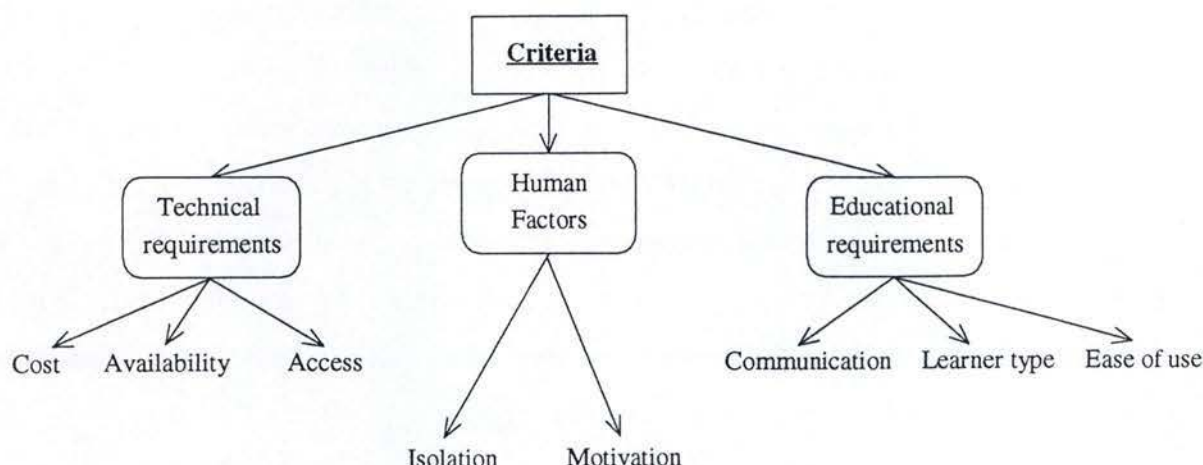


figure 3.1 Criteria for choosing Distance Learning Applications

We think that human factors are most crucial. Dr. Betty Collis¹⁶ does make a distinction between physiological and psychological isolation. Motivation is expressed by the behavior of the student to participate in a distance learning course. To stimulate this behavior, there are certain attitudes like creating a positive learning environment, be responsive to the learner's needs or maintain his attention by building his interest in the course.

Control of participation is an issue because there must be a balance between boredom and excitement. The former might lead to disengagement, whereas the latter may be the cause of disturbance and hinder the participation of other learners.

Furthermore, since emotions are very important in a learning process, the student must be encouraged and his emotions must be positively stimulated so that he feels competent for the course he is engaged in.

A distance learning application therefore must pay attention to the level of isolation and offer the right functionalities to motivate the learner for continuing his studies. Using video-conferencing could for example allow informal discussion between learner and teacher, creating a feeling of involvement from both sides.

¹⁶ Collis Betty, On-line and Distance Education, Department of Educational Instrumentation, Faculty of Educational Science and Technology, University of Twente (Netherlands), <http://www.to.utwente.nl/ism/online95/campus/library/online94/intro/intro.htm>, February 1997.

Technical requirements are mainly important for administrative purposes. When choosing an application, we have to be aware of the fact that it might be necessary to purchase some additional material that will come as a support for that particular application. Licensing fees sometimes are somehow troublesome for institutions that have a rather limited budget. An alternative would be to cut down on the costs and adapt some already available software.

Availability in return is determined by considerations like the need to secure the software maintenance. Also, we have to see that not all applications fit our actual hardware configuration. Access is determined by some technical factors like bandwidth of our communication network or even the number of computers available for the learners.

Our educational system also influences the choice of an appropriate application. The communication criteria offers two alternatives: synchronous and asynchronous communication. Whether to choose one or the other depends on the objectives a distance learning course tries to achieve. In parallel, the application must match the profile of the learner. It is useless to purchase hyper-sophisticated software if the learners are not familiar enough with modern telecommunication applications. This factor also determines the 'ease of use' by the students. However, we have to stress that the learner's profile does not only cover his technical knowledge, but also his capacity to reason, to communicate or even his willingness to adapt to new situations. But the software itself might have an inappropriate interface that makes it impossible, even for a computer science student, to efficiently use the functionalities provided.

The choice of a distance learning application is always a compromise between those three major factors. Doing a compromise seems acceptable when using Distance Learning as a complementary mean for education. However, if the goal is to substitute a course by using a particular distance learning application, it should be quite penalizing to allow compromises.

We think that the choice of an application is influenced by the attitude of the institute implementing Distance Learning facilities. If a pedagogy professional was responsible for the choice, he might probably value educational requirements. To the opposite, a person directing an educational Institute is going to first stress technical requirements (e.g. costs) and eventually consider human factors or educational requirements.

3.2.2 CHARACTERISTICS OF SOME DISTANCE LEARNING APPLICATIONS

As we already mentioned the usefulness of Computer-Mediated Communication, we will now pass through the characteristics of some CMC tools. However, we want to recall that Computer Mediated Communication (CMC) represents one of many tools that may be integrated in an educational environment, especially for Distance Education. CMC has the potential to provide a means for the weaving of ideas and information from many people's minds, regardless of when and from where they originate. The educational potential of computer-mediated interactivity and the openness to multiple discourse and perspectives which it permits, is enormous. But, if we opt for CMC, we must consider some implications that can result from its integration into an educational environment :

- implication of adopting CMC for education with specific reference to learners, teachers, integration with other media, and overall organizational factors.
- CMC as a new educational paradigm, taking its place alongside both Face-to-Face and Distance Education at the same time; it will change the nature of traditional multimedia Distance Learning.

These are the main characteristics (see figure 3.2)¹⁷ of different technologies that make possible the realization of Distance Learning.

¹⁷ Laughton Stuart Charles, *The design and use of Internet-Mediated Communication Applications in Education: An Ethnographic study*, op.cit.

Application of Mechanism	Communication Type : Discourse	Discourse Record	Scope	Structure	Distribution	Media
e-mail	one-to-one	persistent copied	private	messages/ reply	different in time & place, asynchronous	text
Daedalus Interchange	many-to-many	ephemeral	private	structured message interchange	same-time, same place, synchronous	text
Teleteaching	one-to-many	persistent copied	public	satellite, TV	same-time, different place	audio-video
Tele-conferencing	one-to-many	ephemeral or copied	public/ private	digital video	same time, different place	interactive audio-video
WWW	one-to-many	persistent copied	public/ private	WWW server	different time and place, asynchronous	text, hypertext audio-video

figure 3.2 Characteristics of different technologies used for Distance Learning

This table (see figure 3.2) contains five columns that summarize the most important features of applications that can be used for Computer-Mediated Communication. The six main rows of the table define the elements that are relevant to ethnography, CMC and also Distance Learning.

The communication type among these elements specifies what kind of discourse (i.e. discussion) the application uses to provide communication between learners. The discourse record defines if the discussions that take place are stored somewhere onto a support (cfr. harddisk or floppy-disk) or if it stays ephemeral inside the memory of the system that the application runs on.

The 'Structure' element is important for ethnographic purposes and explains under what form the discourse takes place. Time and place considerations of the communication are the features that the 'Distribution' element tries to clarify, whereas the 'Media' states if the communication is realized either by text, audio and/or video.

All the features seen in this table may be partially found inside the applications that will follow this paragraph.

3.2.3 PRESENTATION OF SOME DISTANCE LEARNING APPLICATIONS

3.2.3.1 Electronic mail

The basic idea for e-mail is the notion of a « message ». The messages are routed by the system to the addressee's mailbox on the host computer, and wait there in order to be read.

Often considered the most basic form of networked enhancement to teaching and learning, the radical potential of e-mail for changing our teaching can be almost overlooked because of its familiarity. As we know, most universities provide e-mail accounts and free software to all registered students.

Yet, using an e-mail discussion list for a given class can substantially increase students' interaction with each other and with Graduate Teaching Assistants (GTA) and faculty. Such interaction can be easily tracked for evaluation purposes, and because listservers¹⁸ operate continuously, they substantially increase the time within which students can learn together.

At the same time, as with any form of interaction--even classroom-based group discussions--a faculty needs to establish rules for these conversations. For instance:

- Should the list be solely for announcements or for discussion?
- How often should/may students post?
- How quickly will the faculty reply?
- Should there be topics established for the interactions?

Faculty are using the e-mail facilities to post assignments, conduct focused discussions through length-defined postings, respond to questions about homework and class readings, engage students in criticizing each other's work, etc.

3.2.3.2 Computer Conferencing

Computer Conferencing systems, although based on similar technology to electronic mail, use the filing and organizing power of a host computer to support sophisticated group and many-to-many communication facilities. Individual users can join 'conferences' on specific topics of interest; a given user may be a member of such many conferences, each conference containing the cumulative total of messages sent to it by the various conference members. As in electronic mail, conferencing on such a system is asynchronous, i.e. does not require that all members be present and active at the same moment in time. Unlike Face-to-Face Conferencing, telephone or video-conferencing, participants are not forced to respond immediately to questions and to other 'participants' interventions.

3.2.3.3 On line Databases and Information Banks

Information can be stored in databases on the same host computer which is used for an electronic mail or Computer Conferencing system, or alternatively, users can access a variety of existing public or private database held on other computers. It is more economical and efficient to search for domain-specific information in such electronic databases than to use more traditional information sources. Even for small groups of widely dispersed members, it is frequently more economical to make information available in this way, rather than through more conventional means, such as photocopying or mailing. Users can locate required information with a variety of search methods and, if needed, download the material into their own micro-computer for subsequent printing.

Setting up a database can be relatively straightforward, although its maintenance and up-dating may represent quite a considerable commitment.

3.2.3.4 Hyper-News & NetForum

On-line Web-based Discussion Forums

Adapting the outline and « threaded » structure of Usenet News Groups, these tools allow for an effective web-presentation of student interactions on various topics. Access can be

¹⁸ Servers that contain newsgroups and electronic mailing lists

restricted by password or forum membership, and because the semester's material accumulates and remains readily available, students can easily retrieve past postings for review or research. (similar to *Frequently Asked Questions*)

Here are two experimental examples:

- **Hyper-News**

Hyper-news provides « newsgroup-style » threaded discussions

- **Net Forum**

The NetForum is a Web-based group communication and collaboration system.

Within any NetForum, the student may browse topics, messages and replies, add topics and messages, send e-mail directly to forum participants, and more. The forum is written in Perl and, once customized for the student site, should work on any UNIX-based system with Perl 4.0.1.8 or later that supports CGI¹⁹ sub-directories.

3.2.3.5 The Daedalus System²⁰

During our training period at Virginia Tech, we had the opportunity to get a short introduction to a system officially called DIWE²¹. The following description of this system is based upon explanations provided by Len Hatfield (Virginia Tech) and official system specifications by the Daedalus Group²². We think that the Daedalus System has to be mentioned because of its widespread use at Virginia Tech to help students develop their writing skills, without the necessity for the teacher to be constantly present and supervise every single student. This application therefore incorporates some important distance characteristics.

According to their authors, DIWE also called the « Daedalus Integrated Writing Environment » is based on a form of learning that is computer-based and fully integrated in order to allow the use in classrooms that do not necessarily need to have an academic background. This tool is said to promote integrated learning since it enhances the process of

¹⁹ Acronym for 'Common Gateway Interface'

²⁰ The Daedalus Group Inc., The Daedalus Home Page, Austin, <http://www.daedalus.com>, November 1996.

²¹ Daedalus Integrated Writing Environment

²² The Daedalus Group Inc., The Daedalus Home Page, *op.cit.*

writing by providing an appropriate tool for every aspect from brainstorming to discussing ideas.

These tools are essentially writing activities and teaching tools which DIWE also uses to encourage teachers to explore and apply the possibilities of a text-sharing pedagogy. The system helps students to interact and communicate more effectively. They are encouraged to participate more and more in class activities. Furthermore, DIWE helps in the process of developing critical thinking skills and can be used to support language learning in English or other languages.

It is necessary to stress that this writing tool is mainly meant to be a tool to enhance interaction. Most networked interaction tools actually are still text-based. Nevertheless, these writing environments offer the opportunity for « real-time » conversations among students, graduate teaching assistants (GTAs) and faculty. This kind of « virtual contact » has proven to be highly useful in most on-line courses.

Len Hatfield, a teacher in charge of the Daedalus System installed at 'Virginia Polytechnic Institute and State University' defines the system as a multi-purpose integrated writing environment, which includes tools to aid students at the beginning and throughout the writing process, providing users an easily learned and reasonably efficient way to start writing, revise documents, exchange e-mail organized around specific classes and/or topics, and explore ideas collectively through 'real-time' on-line written conversations.

The global architecture of the Daedalus System is given by the following diagram (see figure 3.3):

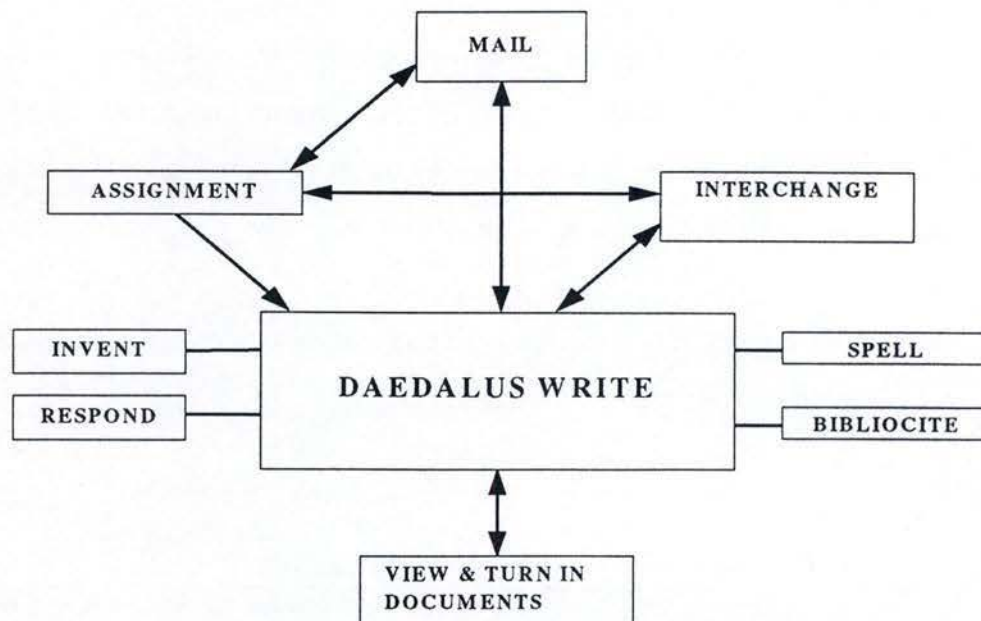


figure 3.3 General Architecture of Daedalus System

This is the 'official' diagram, but the system mainly features the following eight modules:

- 1) InterChange
- 2) Mail
- 3) ClassManager (including 'View and turn in documents')
- 4) ClassAssignment
- 5) Write (including the 'Spell' module)
- 6) BiblioCite
- 7) Invent
- 8) Respond

The 'InterChange' module is meant for the facilitation of synchronous (real-time) discussions. These discussions might occur inside whole classes, small groups, or both simultaneously. At Virginia Tech, students all receive pseudonyms which makes it impossible to identify them as male or female (for example: Chris or Pat). This allows privacy and students may write messages and send them to all the members of a discussion group for immediate viewing. Another positive effect of this privacy characteristic is that the students are more inclined to participate in discussions, even if their character is more of a passive nature.

This tool basically provides a way for the teacher to organize discussions inside a group of students while the surveillance and guidance are still under the responsibility of the teacher. Students need to work together collaboratively by exploring solutions and discussing them in order to find a solution, whatever the problem to solve might be.

As a result of these discussions, transcripts are automatically saved to a fileserver. They can also be saved on a disk or being printed out and reviewed any time later after the discussion.

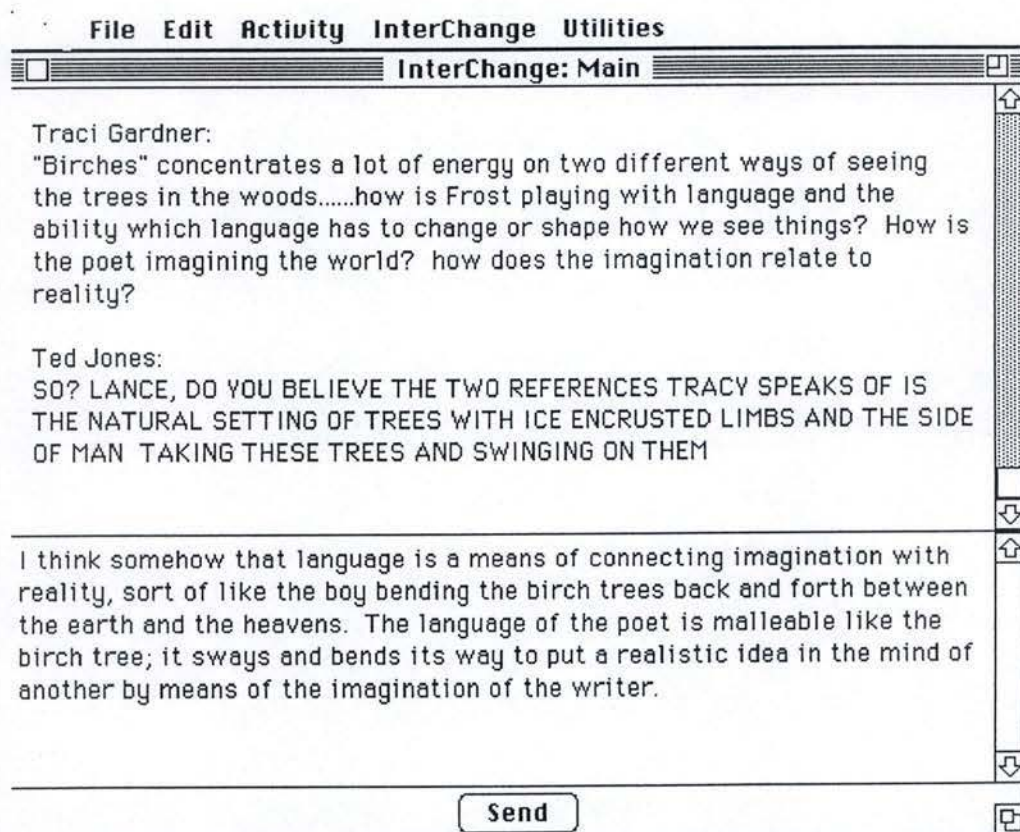


figure 3.4 A sample screen of the «InterChange» module

The sample screen (figure 3.4) shows how learners write their messages inside the lower part of a window that is split and organized in a way that the upper part constantly displays the comments of the whole group of learners.

The 'Mail' module is a simple Local Area Network (LAN) e-mail function which allows a set of communication from private mail to group work (e.g. a kind of broadcasting system applied to e-mails). In fact, this e-mail tool is a modified version of the e-mail system everyone of us uses throughout the whole year. It is thought to provide the possibility of sending messages, drafts, responses to peer work, and other documents to individual students, to members of a collaborative group, or to the instructor. This module also features date, time and receipt stamps which effectively make this module a tool for class management. The main advantage of this function is that students gain confidence in themselves as writers when realizing that others have actually read and responded to their messages.

However, one has to be aware of the fact that this tool is only aimed at running inside a Daedalus session and therefore cannot be compared in any way to existing e-mailing systems like 'Eudora' for example.

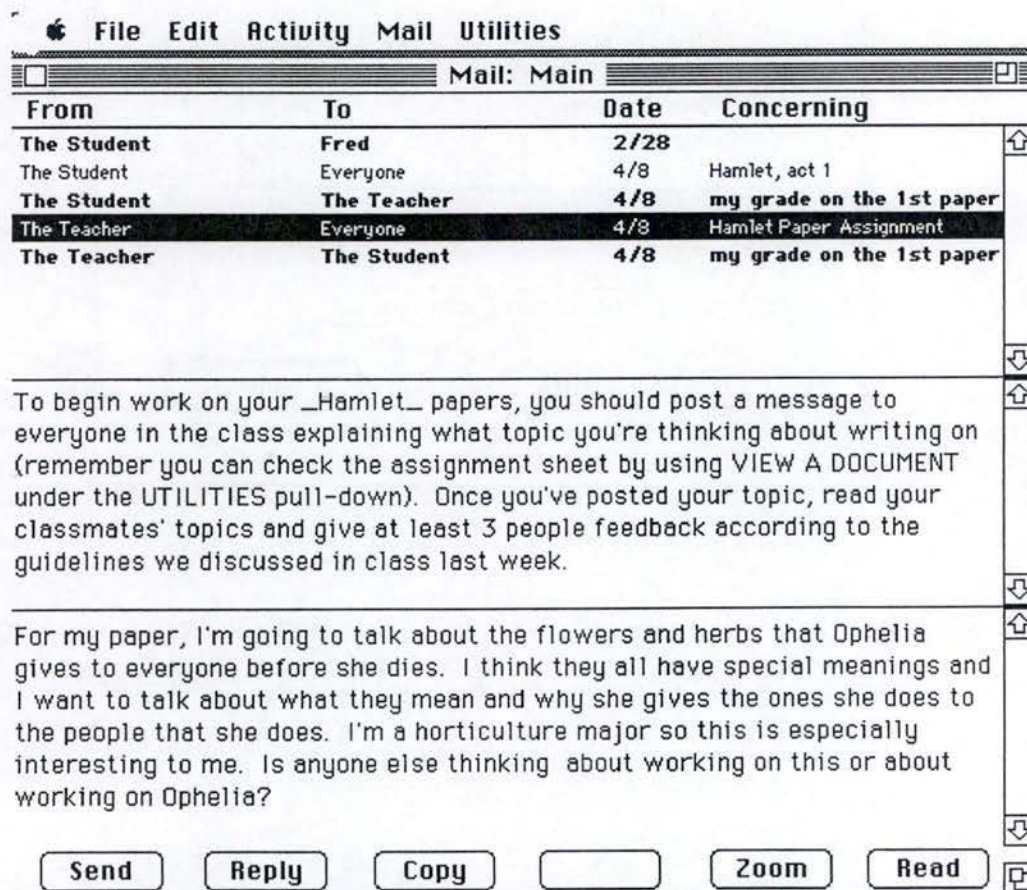


figure 3.5 A sample screen of the «Mail» module

The sample screen (figure 3.5) shows how this particular e-mail module may be used as a kind of electronic bulletin board, where everyone may post a message that is received either by a single person or the whole group of learners.

The 'ClassManager' is a built-in tool which administrates the process of logging into your classroom, manages network writing documents, allows you to add external programs to the Daedalus menus, and provides most of the common network commands that might confuse a student not accustomed to a networked environment. In addition, the 'Utilities' feature allows students to view drafts as well as other on-line documents previously saved to the server. Submission of files to the network for peer and instructor access is possible too.

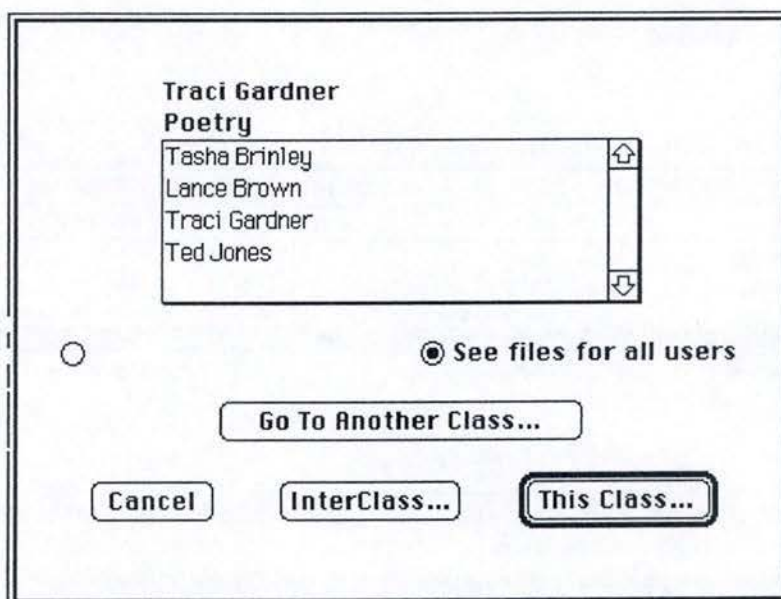


figure 3.6 A sample screen of the «ClassManager» module

The sample screen (figure 3.6) displays a set of users in a particular class. The learner selects the file of a certain person and it is being shown in a 'read-only' mode. The message may not be modified. This tool is particularly interesting for teachers who may submit the documents handed-out in class.

The 'Class Assignment' is a module that enhances communication. The kind of communication used here is 'one-way' to allow teachers to communicate with students as a group. As soon as

the students log in, the feature automatically shows up and therefore it may be used to « choreographic » learning activities. Assignments can be saved to the network so that the learners can refer to previous assignments for catching up more easily in case they have been absent for those assignments.

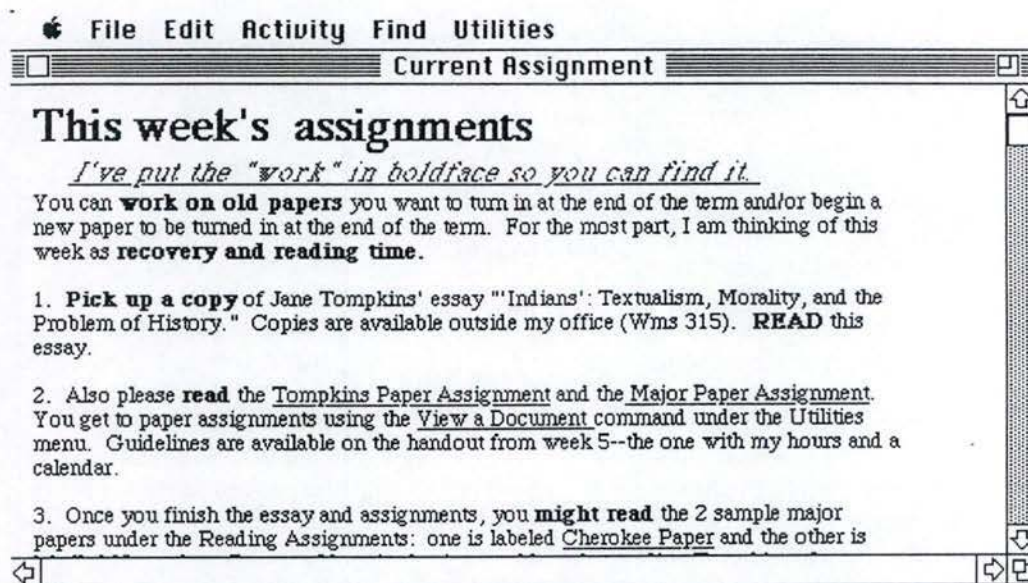


figure 3.7 A sample screen of the «ClassAssignment» module

Obviously, the sample screen (figure 3.7) shows that this module reminds the learner of his assignments. But this tool may be used in a variety of other ways than simply being an electronic bulletin board.

The 'Write' tool is a standardized and simplified word processor which gives a help to the students to facilitate the writing of their home-assignments. It is a very easy-to-use tool which allows the students to concentrate on the actual content of their paper, rather than worrying about a 'fancy-looking' text layout.

The features of this 'streamlined' word processor therefore allow teachers to focus on writing, not word-processing. It includes many of the most popular basic operations (copying, pasting, spell-checking, bolding, underlining, printing,...etc.) and allows importing and exporting to/from other word processing applications. To further facilitate drafting and revising, students are free to copy 'Write' and to use it outside the classroom.

Macintosh(TM) and Windows(TM) versions include an 80.000 word American-English on-line dictionary, spell-checker, thesaurus, and concordance; Spanish, French as well as German language tools are also available.

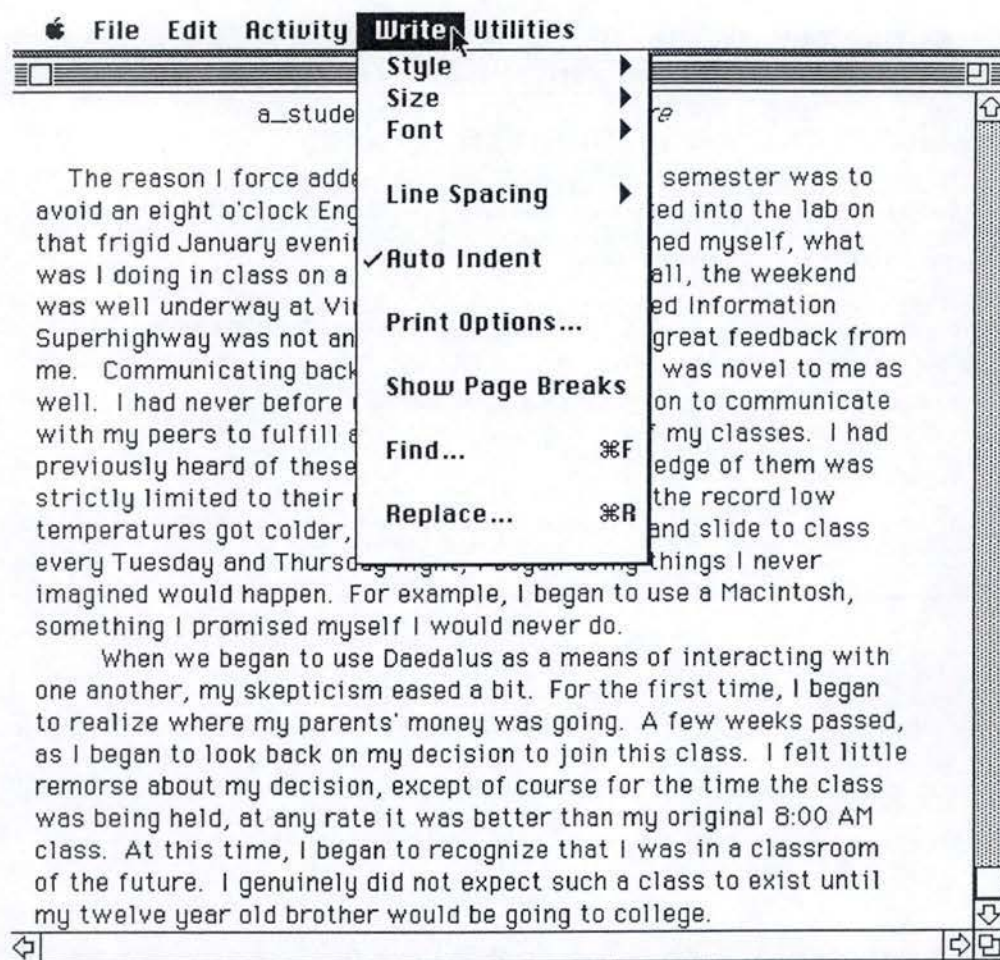


figure 3.8 A sample screen of the «Write» module

Since everyone knows what are the functions of a simple word processor, this screen (figure 3.8) doesn't need any major explanations.

The 'BiblioCite' features the characteristic of prompting writers for bibliographic information, maintains a database of sources, and automatically formats Works Cited pages in either MLA²³

²³ Modern Language Association

or APA²⁴ styles. BiblioCite also allows writers to record and to include annotations for their references.

The image shows a software window titled "sample bibliocite entry". Inside the window, the text "Joyce, James. Ulysses. New York: Vintage, 1961|" is displayed. Below the text area, the window is divided into three sections. The left section is labeled "1 record" and contains navigation arrows, a box with the number "1", and a "Go to" button. The middle section contains two checkboxes: the first is checked and labeled "Include this record on Works Cited page", and the second is unchecked and labeled "Include annotations on Works Cited page" (with a small "NOTE" icon to its left). The right section is labeled "Bib Style" and contains two radio buttons: "MLA" (which is selected) and "APA".

figure 3.9 A sample screen of the «BiblioCite» module

The sample screen (figure 3.9) shows that the system tries to gather bibliographic information. The style of the entries may be in different formats (e.g. MLA or APA). It is possible to include annotations for the different references.

The 'Invent' tool allows an easy way to write down all the ideas that the students get concerning a specific topic by using the 'brainstorming' method. The main function of this module is therefore to caption the text relevant to a particular topic which the student has to deal with. After typing his ideas, without any concerns for a page-layout or grammatical mistakes, the student is being asked by the module to review the text he has written and to specify a title which functions as a summary of the general idea the text is dealing about. Obviously, this module doesn't contain a particular interactive function at all.

More generally, this module is a 'heuristic prewriting' tool. Invent therefore prompts students to form, to explore, and to express their ideas while promoting a divergent thinking (which means that students more easily make connections between different topics). Writers then may save, export, or print their responses to the prompts in order to generate first drafts. Using the

²⁴ American Psychological Association

PromptManager tool that comes with DIWE, teachers get the possibility to customize these questions or create new prompts to suit specific courses, students, and class assignments.

Invent	
Prompt 1 of 12	
What aspect of The Spanish Inquisition interests you the most? What aspect of The Spanish Inquisition would interest your reader the most?	
I am most interested in the life of Tomas de Torquemada.	↑ ↓
The Spanish Inquisition was neither Spanish nor an Inquisition.	
The Spanish Inquisition	

figure 3.10 A sample screen of the «Invent» module

This screen (figure 3.10) gives an example of how the module tries to focus students on exploring, developing and expressing their own ideas.

Finally, the 'Respond' module is a tool which mainly serves the teacher to set-up a set of questions in order to get the students to deepen their thoughts about a certain topic. Therefore, the teacher can edit different scripts that are meant to ask interesting questions (which materialize as a series of prompts) about a certain topic, that students have to answer in an appropriate way and by submitting them via the Daedalus system. This procedure is an evaluative process because the students are guided through a series of prompts.

As teachers may customize existing prompts or create their own ones, students may view on-line peer drafts, or other documents.

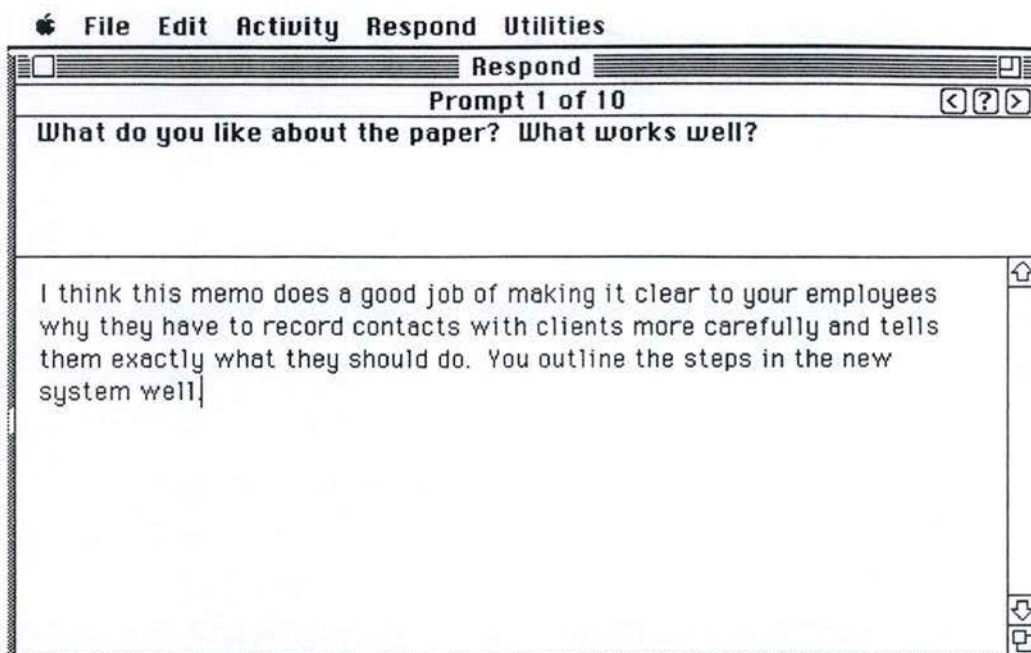


figure 3.11 A sample screen of the «Respond» module

The last sample screen (figure 3.11) shows how the teacher-customized scripts are prompted and the need for the learner to respond to relevant questions related to the course.

It is necessary to acknowledge that the Daedalus system, in the way it is actually in use at the Virginia Polytechnic Institute and State University, does only run locally inside the university environment (i.e. on-campus) and that it is impossible for the moment to connect from a remote system. These constraints are due to the limits the Macintosh(TM) software imposes. This problem could only be solved by modifying the actual Daedalus software.

Fortunately, the currently limited to MAC-based, on-campus Computer Integrated Classroom labs, Daedalus system will soon be available for access from the Internet and in cross-platform versions.

According to Len Hatfield (Virginia Tech), the Daedalus package is being used in Biology, Art History, Human Resources and English, in classes ranging from freshman to graduate level. Faculty working with Writing Intensive courses are finding it particularly useful. This usefulness is proven by the wide-spread use of the system by high-schools, colleges and universities inside the United States.

For smaller classes (10 to 35 people approximately), Daedalus offers an interesting and productive learning method in which faculties are able to explore net-based teaching as a way to review their pedagogy.

One may wonder why we need to review the current pedagogy. To our appreciation, it is simply one of a couple of interesting tools which allows the teacher to get his students to respond and to interact in more or less large groups of people. Passivity and disinterest from the part of the students frequently leads to the failure of current educational pedagogy. Providing new ways for interaction therefore constitutes the context in which Daedalus tries to bring in into the scope some more or less new methods for learning and teaching.

3.2.3.6 An On-Line Distance Learning System using Digital Video and Multimedia technologies

The purpose of the on-line Distance-Learning System is to make use of emerging digital video technologies and multimedia networking to deliver live and stored video lectures and seminars to students at their desktop computers over local area and wide area networks. For the sake of realism and concreteness, the design of this system is realized in the context of a particular environment. The system is designed to provide the students with the following functions:

- real-time capture (digitization and compression) of lectures and recording of the compressed video onto a central on-demand server.
- transmission of compressed video over the campus network to on-campus library servers and privately-owned servers where subsets of the captured lectures can be viewed live by means of stations connected to these servers, and stored for later on-demand access.
- transmission of compressed video over wide area networks (such as switched-56Kb/s and switched-T1 services, public data networks, the Internet, or experimental ATM networks) to servers remote customer sites where subsets of the captured lectures can be
 1. viewed live by means of stations connected to these servers, and
 2. stored for later on-demand access.
- real-time transmission of compressed video over local and wide area networks to individual desktop computers connected to these networks for

1. live viewing of captured lectures, and
2. access to on-demand servers.

This system represents the first step towards a more enhanced support of Distance Learning in which interactive communication and integration of video with other media are also provided.

The effort consists in the design and implementation of a system, noting that most of the digital video, storage and networking technologies needed are currently available.

3.2.3.7 WWW

Technical aspects of the WWW, the integrator of « cyberspace »

In order to discuss « when the Web » works in education, let us shortly recall « how the web » works. The World-Wide Web was conceived by Tim Berners-Lee at CERN in 1989 as an information integrator within which all available information on the Internet could be accessed in a simple and consistent way on every kind of machine architecture. A standard WWW browser (i.e. the client program for the WWW) can access at least the following communication protocols: HTTP (WWW's Hypertext Transfer Protocol), FTP, NNTP, WAIS and Gopher. Central for information retrieval is the Uniform Resource Locator (URL). A URL (e.g. « <http://tecfa.unige.ch/welcome.html> ») is composed of a protocol indicator (e.g. « http »), an Internet machine name (e.g. « tecfa.unige.ch ») and a file name (e.g. « welcome.html »). Usually the file name stands for a document to be retrieved. Sometimes, a program will be launched, e.g. « <http://www.ucc.ie/htbin/acronym> » will launch a program for looking up Internet Acronyms). Note that in general any networked software can be turned into an HTTP server and this is important for future educational WWW-based systems.

The standard WWW information vehicle is a hypertext document, a text file encoded with the so-called « Hypertext Mark-Up Language » (HTML). An HTML file will display on your screen according to special mark-up commands and according to the settings and capabilities of your client-program. Special highlighted buttons in a displayed « page » allow retrieval of other pages from anywhere in the world (including any kind of file formats that your setup can handle).

The server tells the client what file type is accessed. When a file format is met that the browser does not understand (e.g. a Postscript, a VRML or a Toolbook file), a « helper » application is called, if it is available on your machine. You can configure your client to use any kind of program to display any multimedia image, sound, video and data format. Note also, that most WWW clients can display In-line images. HTML is an evolving language: The latest version (HTML 3) allows for quite sophisticated layouts (e.g. tables, text floating around images).

Forms are an important feature of HTML. They allow a server to query the user with a few standard graphic user interface (GUI) widgets like push-buttons, radio-buttons, text editing windows and scrolling lists. This information can then be processed by the server. It makes up a powerful query-interface to various kinds of databases, but it can be used as interface to any program running on a server. Because HTML pages can be generated dynamically by a server, such pages can be tailored according to the needs of the user, which is an interesting feature for educational systems. Another feature are interactive maps which report to the server the position of mouse clicks. Such maps can be used to build user navigation aids.

Given this technical description, the WWW can be characterized with several functionalities:

1. A Knowledge Integrator
2. A distributed Hypertext
3. An Interface to any kind of remote program
4. An Interface to certain local programs

For producing HTML, there are 4 basic strategies:

1. Using a simple text editor (inserting html tags manually),
2. Using a « smart » text editor or an HTML tool that includes special editing extensions for automatically inserting HTML tags (like HTML assistant for Windows; or an « HTML tool » like HotMetal)
3. Using « filters » (translation programs that translate from text or other formats into HTML)

4. Using programs that create HTML « on the fly » (a feature frequently used to display output resulting from a database request, on-line questionnaires and assessment programs).

Option 1 is not very productive, Option 2 is best for producing short Hypertext material, but using those tools requires some training. Option 3 is a good solution for producing larger document structures that also can be printed. However, currently these filters are not powerful enough (especially in the world of micro-computers).

We can distinguish several levels of WWW use in education. Classified by order of difficulty they are:

1. The Web as an information tool: Curricula and courses information, etc.)
2. Distribution of learning material: E.g. books (in various formats like postscript, word-processor, etc.), programs, applications requiring a specific interpreter/language for the client
3. Collaboration tools
4. Interactive educational applications

The realization of level 3 and level 4 WWW-interfaced applications are hindered both by the design of the WWW and the fact that advanced programming knowledge is required.

Recently, a few interesting new developments can be observed in the WWW world, like: HotJava (a WWW client that can execute programs), WWW-MOO interfaces, VRML (virtual reality mark-up language) interfaces, Netscape's « server-pushes », Educational packages for CGI-scripts. These extensions and additions will add additional power to the WWW and increase its popularity.

For a long time, the only widely shared communication was hand writing. It was the only way for answering and sending messages. The new communication technologies could improve both individual and social communication. Several technologies, at the time mainly photography, magnetic sound recording and videography, could turn the passive receiver into an active sender and producer of personal messages. Communication for education should aim at improving these skills and competencies for all the citizens. WWW is a good example of a new technology of communication. Consultation of hypertexts on a screen incites the reader to integrate reading and writing activity into one sole process. It quickly becomes necessary to write your own hypertext to classify the information and to create your own information structure. Furthermore, to process read text on a common display (the screen) materially abolishes the border line between the writer's text and the reader's text.

On the other hand, experts estimate that the printed material globally constitutes around 80 percent of all the available Distance Education material. Actually, the main change certainly is the rise of electronic writing and delivery of books or pedagogical material. The WWW is part of this general evolution.

WWW can be seen as an « intertext ». The main idea of the « intertext » is that each text is composed as a mosaic of quotations, like the pointing of others' texts towards a new text. Each text thus belongs and refers to its context: there is no text without a referring context. Each literary text may be considered as a living text. That is also the case for all the other texts and this concept can be applied to other contexts, especially to WWW. Indeed, WWW typically makes available a growing and changing text composed as a mosaic of texts selected by each reader/writer: « dynamic hypertext ».

²⁵ Peraya Daniel, Distance Education and the WWW, TECFA, Faculté de Psychologie et des Sciences de l'Education Université de Genève, <http://tecfa.unige.ch/edu-ws94/contrib/pearay.fm.html>, October 1996.

Networking is typically concerned with a « flow culture ». It implies that the reading process has changed. In the past, we used to read intensively: only a few books but read and exploited in-depth. This reading process has progressively turned into an extensive mode: « a great number of books and leaflets, printed on various supports, multiplied and ephemeral ». The information mass to be read and studied has grown too much. Consequently, if in the past the culture of someone could be defined as the capacity to keep, memorize and recall information, today it should be defined as the capacity to wisely use information; in other words to be able to retrieve information when it appears necessary.

The WWW can be represented as an electronic book. The electronic book really differs from the printed book. The first difference is that the screen is a neutral object: to recognize and identify a book, we have hints such as the color of its cover, the binding, its size and its thickness, the fonts and the typography, the label of the collection, and so on. Within the book, we can retrieve one piece of information because we remember on what side it is written; on an even or an odd page, whether it is at the beginning or at the end: we do have some spatial and visual hints, including typographical marks, paragraphs, margins.

With an electronic book, all these hints are lost. The text is like a continuous flow of information, unfolding on the screen.

3.2.3.8 Teleteaching

Typically, teleteaching courses televise a professor in a classroom giving a standard lecture and broadcasting this to remote sites and to other students also enrolled in the class. This is often referred to as the « talking head » approach because little use has been made of graphics, animation, or dramatization in the presentation. Derek Rowntree believes that learning by means of televised instruction is neither better nor worse than conventional closed instruction. Two phenomena about both correspondence sources and televised courses, as forms of Distance Learning are worth being stressed:

- the incremental growth of these alternate forms of Distance Learning has been very gradual; and
- the percentage of those students who start such courses;

How are these courses organized at Virginia Tech ?

Thanks to the interview we had with Dr. Benjamin S. Blanchard at Virginia Polytechnic Institute and State University, we realized that since 1983, Virginia Tech and the University of Virginia have televised graduate engineering courses from their respective campuses to various classroom locations in industry, at government installations, and in other academic facilities throughout Virginia. Courses are taught live on the Blacksburg campus and extended via satellite television link, with a telephone network providing interactive audio support. This provides a one-way video transmission and a two-way interactive audio capability. This service links to courses offered at the Northern Virginia Graduate Center by George Mason University, in Tidewater by Old Dominion University, and in Richmond by Virginia Commonwealth University.

The system was developed to meet the needs of practicing engineers and scientists throughout Virginia who wished to pursue course work leading to a master degree. A variety of courses is offered, using the combined resources of the five participating universities. System level support is coordinated by the Virginia Department of Information Technology in Richmond. Televised courses can be viewed by an individual or groups of students having access to a Ku-band digital downlink, a connecting TV receiver, and a telephone.

Virginia Tech offers programs and/or courses in the following areas:

- Civil engineering
- Computer Science
- Electrical Engineering
- Industrial and Systems Engineering
- Systems Engineering

'Supporting courses' in other engineering fields are available as appropriate. At least one half of the courses in a given program of study must be taken from Virginia Tech. With prior approval, students may take selected courses from one or more of the other participating

universities. An academic advisor is assigned for each program area. Questions pertaining to individual course content may be directed to the assigned course instructor.

3.2.3.9 Virtual Classroom

A virtual classroom is defined by to S.R. Hiltz²⁶ as a teaching and learning environment located within a computer-mediated communication system. Rather than being built of bricks and boards, it consists of a set of group communication and work « spaces » and facilities, which are constructed in software.

Before introducing the reader to the main characteristics of these virtual classrooms, one should be aware of the fact that this new kind of classroom perfectly fits into the context of high-school education. Nonetheless, it can be useful to understand the construction of a virtual classroom in order to apply these ideas to a more university-oriented context.

The first requirement of a virtual classroom is given by the necessity that it must at least support the activities of a traditional classroom. Therefore, it needs an interaction space like a classroom to enable group discussion. Besides, providing the ability to divide a larger class into smaller working or peer groups for collaborative assignments seems very important. These assignments or tests have to be administered, collected and graded. Finally, a sort of blackboard needs to be provided.

In opposition to these requirements, there is a need to realize that some activities impossible to traditional classrooms are actually supported by virtual classrooms. Immediate communication of ideas and questions can be considered as a good example showing that traditional classrooms are more restricted for supporting a learning process.

Virtual classrooms are usually defined by considering what are the goals and the means to implement them. The goals and means are foremost the fact of improving both the access to and the effectiveness of post-secondary education. A kind of virtual classroom « round-the-clock access » is a common communication and work space that is crucial for facilitating group

²⁶ Hiltz Starr Roxanne, *The Virtual Classroom - Learning without limits via Computer Networks*, ABLEX Publishing Corporation, New Jersey, 1994, ISBN 0-89391-928-4.

or collaborative projects by means of computer-mediated communication. 'Collaborative' means that the learning here is an interaction between both students and teachers in order to seek the understanding and application of the concepts and techniques that characterize the subject area.

The most important characteristic of Virtual classrooms is therefore the access improvement. Improving access, which actually is a problem for many students, is accomplished throughout the following characteristics.

The location is important since the students may take any course from any instructor and from any institution in the world which is offering courses in this mode.

Flexible time denotes participation at any time of the day or night and having interaction as well as feedback which are not limited to a few fixed times per week.

No travel constraint is a feature that provides a certain comfort and convenience when considering the aged, handicapped or those who must be at home. This eliminates wasted time (overhead) by not having to move from one classroom to the other.

The characteristic of shared work space is an easy way to exchange information that is difficult to share or disseminate in the traditional classroom.

There is also a participation opportunity which makes that every student has a fair and equal chance of asking questions and giving comments.

Nevertheless, these positive features are diminished by a limited access to the virtual classrooms. When talking about « limited access », the reader should be aware of the fact that until now, only few courses are on-line and therefore it is difficult to complete an entire degree program on-line. Students who do not have computers and modems at home are disadvantaged and penalized by the equipment requirements of virtual classrooms.

The limited access can also be explained throughout the delayed feedback inherent in virtual classrooms, which are asynchronous, so answers might be delayed for a couple of hours, whereas in traditional classrooms, the answers may be received immediately.

The textual and technical skills of students play an important part in limiting access to virtual classrooms because poor reading and writing skills, as well as poor knowledge about the system used may hamper the timely exchange of communication. The improvement of the effectiveness is also one major characteristic of virtual classrooms.

Collaborative group learning is facilitated because even with « difficult » time-schedules, students still may work together without losing the self-pacing element of virtual classrooms. As the computer forces responses and attention from the participant, one might argue that this provides a more « active-learning ». Students may use other computer-resources like office programs, simulations, or statistical analysis routines, and profit from having complete notes, which actually is a by-product of the learning process within virtual classrooms.

Considering the effectiveness, one should pay attention to the fact that there is an absence of audiovisual media. This might be a strong requirement for the future. Besides, students might get into potential information overload and be overwhelmed by too much information which in return could influence the motivation and regular participation of the students, since the learning process is meant to be self-paced.

One might argue that the ideas and characteristics of virtual classrooms are very important but that we cannot ignore the problems of the self-paced education which is the basic feature or even problem of virtual classrooms.

3.3 EVALUATION OF DISTANCE LEARNING

After the presentation of all these Distance Learning Applications, we can finally evaluate the concept of Distance Learning and provide the reader with some positive but also negative aspects about Distance Learning before making a brief presentation about the future of Distance Learning.

3.3.1 ADVANTAGES

The most obvious advantage is of course the possibility to overcome learning boundaries of time and space. People from around the world should be able to connect at any time to the Distance Learning server and self-pace their learning process.

Because the World-Wide-Web is nowadays very common, this Distance Learning tool also implies world-wide availability and dissemination of knowledge. Expert systems²⁷ become accessible for everyone and do not remain a privilege granted to a small group of people.

A very interesting feature of any Distance Learning facility should be the enforcement of listening and talking. While under normal circumstances this is not guaranteed, Distance Learning may provide every mean to make talking and listening complementary, since interaction is a very important characteristic of every major educational system.

Besides these general advantages of Distance Learning, there are more specific advantages which usually come along with the different Distance Learning implementation systems.

Computer-Mediated Communication learning may be an advantage for people who because of logistic or economic reasons or even because of work commitments have no alternative other than home-study. People in situations which require a quick and efficient updating of their discipline can profit from Distance Learning (in this example it is an autonomous learning) by teaching themselves what they require to know.

But this type of learning can also be an advantage for those who only want to acquire some further qualifications for the sake of their attainment.

²⁷ « Computer application that performs a task that would otherwise be performed by a human expert. For example, there are expert systems that can diagnose human illnesses, make financial forecasts, and schedule routes for delivery vehicles. Some expert systems are designed to take the place of human experts, while others are designed to aid them. Expert systems are part of a general category of computer applications known as artificial intelligence. To design an expert system, one needs a knowledge engineer, an individual who studies how human experts make decisions and translates the rules into terms that a computer can understand. »

Expert system - PC Webopaedia Definition and Links,
http://www.Sandybay.com/pc-web/expert_system.htm, May 1997.

Considering a more extreme example of Distance Learning, this can be the one and only possibility to acquire knowledge for students with a serious motor handicap.

3.3.2 DISADVANTAGES

Again, if one has a look at the consequences of Distance Learning, it is necessary to take into consideration the different actors involved in a Distance Learning process.

It may not be an immediate disadvantage, but nevertheless Distance Learning requires from the students a very different studying attitude. In addition, a student must show more motivation, perseverance, independence and discipline.

These requirements might somehow create the problem of discontent amongst students using Distance Learning training because they might get a feeling of isolation.

Also, the computer-assisted learning can inherit a couple of risks like the situation in which the trainee perceives failure as being his own fault where in fact, it may be the fault of badly designed software.

Furthermore, the instructor has got to be more responsive to learners' needs and provide more general support and guidance to the student. This also means helping students to maintain their motivation and assisting them to develop their learning skills.

The course developer needs to develop study materials that are of a higher quality. The specific organizational and administrative structure of the training institutes also needs to be adapted and there are certain logistic changes like the computerization of the student tutoring system which are prerequisites for the implementation of Distance Learning facilities.

The design of course material, the commitment of tutors, students as well as management (of the considered institution) are the most important factors in Distance Learning training.

3.4 EVOLUTION OF DISTANCE LEARNING

According to the Florida State University²⁸ there are many indications that Distance Learning as a means of providing education and training is about to significantly change and to experience orders of magnitude growth. Distance Learning, in the form of correspondence courses, offered by both public and private institutions has been available for over 75 years. During and since WW II, the U.S. Armed Forces Institute has offered courses for high school and college credit to literally millions of soldiers. During the past 25 years, Distance Learning courses have also been offered via instructional television from the different Universities in United States.

Why is Distance Learning Changing?

Two developments appear to be significantly changing the dynamics of Distance Learning. The first is Instructional Systems Design (ISD)²⁹, pioneered by Florida State University (FSU) in the early 1970s. ISD is a scientifically based approach to the design and development of instruction and training that has resulted in dramatic improvements in learner success. ISD represents the convergence of the behavioral, management, and communications sciences focused on the problems of teaching and communications technology, the corresponding decline in its real costs, and the increasing simplicity of its use by lay people. The combination of ISD and state-of-the-art technology makes it possible to offer training by Distance Learning on an individual basis literally to anybody, at anytime, anywhere in the world. Actually, it is FSU's intention to offer individual courses and entire degree programs to qualified learners wherever they may be without requiring them to come to the campus, and without requiring a disruption of their work and live. They try to anticipate a variety of instructional delivery components that will include:

- student learning guides;
- self-administered progress checks;

²⁸ Distance Learning at Florida State University, <http://idl.fsu.edu>, November 1996

²⁹ *ibid.*

- modularized teaching/learning resources, to include both print and mediated instruction;
- an e-mail link which will permit a continuing dialogue between student and professor; as well as end-of-course assessment that will result in the award of course credits.

For at least the next few years, this will include videotaped lessons (but not necessarily delivered by video players) that allow interaction. Recently developed technology allows embedding questions in the instructional sequences to which a student can respond electronically and receive immediate feedback as to their mastery of the material being taught. This progressional achievement data can be centrally captured so that the professor can see how each student is performing, and intervene when a student is in difficulty. This « immediate feedback » is difficult, if not impossible to achieve even in a normal classroom full of students, but has demonstrated to be crucial to efficient learning.

Another key feature of ISD-type instruction is that it is empirically developed, that is, the instruction is designed from the outset with a target group of learner in mind. As the instructional sequences are developed they are tried out with selected representatives of the target group to empirically determine their teaching effectiveness; instruction which is weak is revised until it is demonstrably successful. Thus, instruction developed for 3rd-year pre-medical students, for example, will result in the intended level of achievement with virtually all such students. Only after teaching/learning packages have been validated in this manner will they be ready for widespread use and marketing.

As a parallel effort, some Universities are developing packages of instruction which will use interactive CD-ROMs as an alternative to the video cassette mode. The CD-ROM represents the most powerful form of interactive instruction presently available. When the CD-ROM drive is as ubiquitous as the VCR is in American homes, the CD-ROM will be the instructional medium of choice -- until it is surpassed by ever improving technology. In the near future it should become possible for a person to review a wide range of course offerings on their home television set, and see what the prerequisite requirements are for courses in which they are

interested. If they meet the entry-level requirements, they will be able to enroll by computer/TV and then call up interactive instruction at their convenience. Such instruction will not be limited to the traditional academic tracks, but can include courses in upgrading job skills, in meeting professional re-certification requirements, in learning just for the fun of learning, and more.

What kind of distance ?

As with openness, a learner's learning may be more or less distant, and in a variety of ways. We need to ask exactly what the learner is distant from and for how long. There is often some element of distance even in a classroom-based on-site course. For example, which of the following will YOUR learners be distant from and for how long?

- from the teachers/trainers who developed their programs?
- from someone who can respond to their individual concerns or difficulties (e.g. tutor or mentor)?
- from other learners with whom they might pursue joint learning and mutual support from equipment or facilities that might aid their learning?
- from the context in which, or « clients » with whom, their learning is meant to be applied (e.g. student teachers learning in college rather than in a high school)?
- from the books or passive resources?

Not all Distance Learning systems involve all these kinds of distance. Notice that it is accessibility rather than geographical position that matters here. The on-site learner having difficulty with a Computer-Based Teaching package may know that the people who wrote it are in the next office. But if they are not available for consultation, he or she may feel as distant as if they were on the other side of the earth. The effects of this kind of distance are that the demands and opportunities within a learning system will differ according to the factors the learner is at a distance from and for how long.

3.5 CONCLUSION

By introducing a technology such as CMC, Teleteaching, Virtual Classroom, etc..., the creation of new forms of learning is likely to be in conflict with the desire for tradition and continuity. This can quite reasonably give rise to the fear that the technology itself might dictate the nature of future syllabi and educational structures. While this real danger must be recognized, it is important to ensure that the desire for continuity does not prevent the emergence of new, innovative learning and teaching techniques that the medium makes possible. Few would claim that current educational systems and techniques are producing satisfactory results for the required number of people, either in initial or in continuing education and training. For this reason, we have to consider the possibility to change this traditional way of learning into a more effective and innovative way of learning, using all the means that are available.

So far, we have seen that the concept of Distance Learning is created to facilitate learning processes, not only in the University environment but at large, extending the learning in space and time, allowing a great number of students to participate in that process, etc.,...

We must remember that Distance Learning has to be a complementary concept of the classical type of learning, due to the social and cultural constraints. Some social and cultural environments will be more close to such a new method of learning, bearing in mind that the role of a classical teacher will not only be teaching, but to lead and tutor the students in the learning process. The concept of Distance Learning is too general, hence one has to think of it, regarding a specific environment.

It is very important to mention the development of appropriate learning strategies that do not stress too much the technological factor, i.e. the resources available must not be crucial for the implementation. Otherwise, we will face a situation where smaller institutions will be penalized for realizing a Distance Learning process. The relation between the fixed aim (more or less ambitious use of Distance Learning facilities) and the resources used to achieve this target seems to be an important issue to mention. An imbalance between the aim and the resources leads to an implementation of Distance Learning that will be very difficult to realize.

Distance learning as we see it, is a very ambitious method which will probably generalize with the adoption of the ATM network (for the moment this is still a very expensive solution but nevertheless the upcoming system of the future).

Still, Distance Learning is in its growing phase, and the better implementation will be reached when most of the institutions that are engaged in the learning process, will have the adequate means and tools to realize it. We are aware that without federating different Institutions, we cannot quickly progress. We have to gather all means and tools available and try to collaborate in all the fields where Distance Learning finds its application.

Whether Distance Learning is ethical is a question of the social and cultural constraints. According to us, it is always possible to reach a consensus, even in the field of Distance Learning. If more stress is put on social constraints than on Distance Learning constraints, it might be better to apply more classical learning and less Distance Learning (and vice-versa).

4. COMPUTER CONFERENCING

After concluding on the usefulness of CMC to enhance our current educational system, we now have to develop the theory behind computer conferencing to guarantee our understanding of the learning process when using this particular form of communication.

4.1 INTRODUCTION

Computer conferencing systems are based on similar technology than electronic-mail, use the filing and organizing power of a host computer to support sophisticated group and many-to-many communication facilities. Individual users can join 'conferences' on specific topics of interest. A given user may be a member of many such conferences, each conference containing the cumulative total of messages sent to it by the various conference members. As in electronic-mail, conferencing on such a system is asynchronous, i.e. does not require that all members be present and active at the same time. Unlike face-to-face conferencing, or telephone or video-conferencing, participants are not forced to respond immediately to questions and to other participants' interventions.

Computer Conferencing (CC) proves to be the gold mine of information concerning the psycho-social dynamics at work among students, the learning strategies adopted, and the acquisition of knowledge and skills, according to France Henri³⁰ who also states:

« An attentive educator, reading between the lines transmitted by CC, will find information unavailable in any other learning situation ».

This is based on the fact that time limits, in conventional on-campus work, is making physically impossible for all the learners to have their say (and focusing on the content of interaction) on the subject matter, rather than on the learning process itself. On the other hand, CC, freed from the constraints imposed by time and space due to its asynchronous character, allows all participants to express themselves.

« Instead of turning to the computer to give us answers, we learn to use it to contact others who might have pieces of the puzzles we're working on. People have the answers ; computers help us in finding those people and talk to them. »³¹

This quote from *Training Magazine* suggests how educators can use the Internet and computers to bring students together for problem solving and improving understanding. Computer conferencing is a solution proposed for it.

There are two main fields for developing Computer Conferencing systems :

1. Industry

The use of CC goes up and down with the economy and the trends in industry. Although industries could have a large training budget or not, the companies need to train their staff at a pace and time that will not disturb or affect the continuity of the company work. Industries do recognize the need for better trained employees and adopting a philosophy of lifelong learning.

We deliberately chose not to talk about Computer Conferencing in industry but to only consider the academic environment.

³⁰ Kaye Anthony R., *Collaborative Learning Through Computer Conferencing - The Najaden Papers*, Springer-Verlag, Berlin, 1992, ISBN 3-540-55755-5 (cfr. p.118).

³¹ Filipczak R., « Trainers on the net », *Training Magazine*, 1994, p. 42.

2. Universities

Universities are an important user of new technologies of communication, especially those that are more open, cfr. Open Universities. Other Universities, even if they don't use those technologies for education, are increasingly using for their everyday academic life.

Furthermore, CC is not adapted to all the academic courses. This is true for some courses which need to be developed face-to-face or when results are more effective than Computer-Mediated Communication; this is also true for other courses that are realized in a closed educational system.

4.2 AIMS FOR EMPLOYING THOSE TECHNOLOGIES OF COMMUNICATION

First, we need to give some explanation to better understand why those technologies are employed.

4.2.1 McCONNELL ARGUMENTS³²

McConnell puts in contrast two views of cooperative learning which are « Learner focus » and « Learner power ».

4.2.1.1 Learner empowerment

Learner empowerment means that we shift to a learning situation in which the learners are empowered to take control of their learning to the extent that they guide the teacher towards their own goals and interests, rather than passively following a pre-set syllabus that they had no hand in devising.

McConnell suggests course design factors such as

- structure
- teacher control
- moderation of learning
- learner motivation

³² McConnell David, *Implementing Computer Supported Cooperative Learning*, Kogan Page, 1994.

- learning content
- assessment

can be placed on a scale. At one end is cooperative learning as part of an overall curriculum, involving tasks that students have to work through. At the other end is « *a form of open, negotiated learning... (which) emphasizes internal moderation by learners themselves* ». McConnell (1994, esp. Chapter 5) gives an impressive account of this second type of learner powered cooperative learning, and argues that the CC medium contributes to its success in his courses particularly in regard to « time » and « gender » issues. He shows, for instance, how women get more freedom to make full contribution within the neutral context of text-based communication, whereas they are less present in face-to-face contexts.

A more significant issue, however, is « time » in group dynamics. Face-to-Face meetings are limited by the need to travel to, and return from, a defined place - a room that has to be booked for one or a number of fixed periods. By contrast, asynchronous CC allows all participants to arrive and leave at times of their own convenience. Furthermore, as long as the computer system is up and running, it is open for indefinite continuous use, so that there is « little if any sense of loss of relationship between participants working cooperatively in on-line groups, since they are constantly relating to one another. Discussions are often prolonged, and participants can use the time to dig deeper into issues ». Perhaps most important, since all the discussions are permanently held on the computer, participants « can reshape conversations on the basis of their ongoing understandings and reflections. They can revisit 'old' conversations and restart them ».

McConnell cites students' comments about the downside of such continuity.

It is extremely time-consuming : « You know, it's just sort of eaten into my whole life » said one participant, who found that he felt he was a member of a never-ending discussion to which he had to keep on contributing. The students participating in on-line courses have made similar comments about open discussion in that course, and so have many other CC users. This is usually called « overload », a term referring explicitly to the large volume of discussions that may appear in a CC, but implicitly also to the attendant pressure to contribute to it. One of the students commented : « If others have so much to say, then I had better say something

too; but that will enlarge the conference even more, and I'm not sure if other people will appreciate me doing that, especially if I don't have anything brilliant to add ».

The users have a feeling of overload and uncertainty when

- (i) a conference is largely left to them as an open discussion area, and there is no specific indication to them of what or how much they need to say ;
- (ii) there is no arranged closure, i.e. point at which a discussion may be felt to have reached its goal, as well as a timed ending to the conference.

Their reactions range from becoming highly motivated and submerged in the CC, to making hopefully sufficient minimal contributions, or even remaining silent readers only. Indeed, in such open discussion, there is constant concern among participators about how to provoke the silent ones to come on board. In the literature, the term « lurking » has been coined for mute CC participation.

Moreover, in a completely flexible and unstructured discussion, anyone can comment as much or as little as he wishes on any given point. Some may go off on tangential matters ; some may only comment on other people's comments rather than putting in original material of their own. Messages are added into a CC in chronological order and this is quite randomly dependent on when people log in. So, if there are various issues under discussion (even if linked quite tightly to one central theme) and a number of people add their comments at random, a comment to a point made in Message 2 might actually get in as Message 9, the intervening messages being from other students about other matters. Overload and randomness in discussion are not ideal for courses where students are struggling with new information and preparing for traditional assessment.

4.2.1.2 « Learner focus »

Learner focus means that we have a situation where the teacher does not dominate in a classroom but instead creates an environment in which learners have the opportunity to contribute, to talk to each other, and to work in ways that suit them best.

The role of a lecturer/tutor becomes also. He cannot control as in face-to-face class the interactions, once they are set going, but he has to choose how to comment on different

answers as they appear in the conference. While only commenting on some would create the risk of favoring or criticizing some students, a solution could be to reply on a student's answer, only if the student explicitly asks for help or if there is a misunderstanding that needs immediate clarification. At the end of each session, the tutor then may provide a general overview concerning the subject, including interwoven comments.

In those environments, it seems that students know what is expected from them, enjoy the collaboration, and in most cases all the allotted tasks are completed³³.

4.2.2 OUR ARGUMENTS

In our case, we employ this technology because it seems to be the best technology that fulfills the conditions, constraints and demands at the Computer Science Department of the University of Namur. Considering that Belgian and European educational system is less flexible (or dynamic) and that there are serious time constraints, we think that it would be more appropriate using an electronic computer conferencing application as a tool to support a learning process.

The major problems that we encountered in traditional the face-to face classrooms are the following :

- *Dependency towards a time schedule.* This problem is in close relation with the educational system which does not provide any means for the students to organize their course schedule. There are not many so-called 'optional courses' which can be chosen in regard of the field of interest and time availability of the student.
- *Non-participation of the students due to various factors.* In general, students are not very inclined to participate in any course discussions for reasons of shyness, disinterest, not being used to participate, etc...
- *An incomplete and time-consuming process of consulting the reference documents.* Having to work through all the documents that the teacher hands out to a student does in fact create the problem for the student of spending a lot of time in reading documents that are not very well understood. The individual student does not have

³³ Pincas Anita, « Why Computer Conferencing may help students more than face-to-face teaching », Institute of Education, London University, 1995.

enough time available to really think about what he reads and then chooses to compromise between fast reading and not getting a deep understanding of the content.

- *A not well-defined task division.* When organizing lectures, traditionally a small group of people is in charge of presenting a whole topic to the entire class. This leads to the procedure of task division between the students. An enormous amount of course documentation frequently leads to incoherence and redundancy during the later presentation because of a lack of coordination between the group members.
- *Cooperation limited to a small group of students.* The mere fact of separating students into small groups of individuals to present different topics is not a very rational process since there are always limited numbers of students (those who do the presentation) cooperating in some sort, the rest of the class remaining stays more or less passive.

What are the solutions brought up by the Computer Conference, applied directly to our problems ?

Taking into consideration the solutions proposed by McConnell, such as « learner empowerment » and « learner focus », we think that we will only need to realize a CC course simulation when integrating the following solutions:

1. Asynchronous interactivity between students allows to eliminate the time constraint
2. Throughout this system, student participation is encouraged by using tools that include a system to supervise their participation, the content of all the proposals, the use of pseudonyms, etc...
3. There will be one or more web-pages displaying all the necessary information and/or the needed references to set up the conference.
4. There is no need for a task division, since everyone has to participate.
5. An increase in cooperation is expected throughout effective participation.

These were the main points that pushed us towards the choice for the CC as a possible application of Distance Learning. But, there are other arguments, founded in the argumentation

of different authors (see section below) who have already practiced Computer Conferencing in their education/learning process.

4.3 ADVANTAGES OF COMPUTER CONFERENCING

The reading of numerous books mentioning Computer Conferencing (CC) in relation with CMC allows us to give some examples of benefits that some authors usually put forward.

In particular, S. Cerri³⁴ thinks that CC is very helpful for « *the encompassing of the total educational process* » and therefore realizes a more homogenous learning environment.

France Henri³⁵ states that proof is given that CC is as efficient as traditional classwork but that the main advantage of Computer Conferencing is to provide collaboration between learners. The author tells us that the social dynamics of CC have the benefit to favor « *social cohesion within a group* »³⁶. In this context of collaboration, A. Kaye³⁷ sees the advantage of providing shared working and learning spaces. Therefore, CC supports collaborative activity for many-to-many communication. Concerning the mostly asynchronous nature of Computer Conferencing, A. Kaye thinks that CC « *is more conducive to seminar and syndicate interactions* ». Betty Collis³⁸ underlines this attitude by stating that group activities inside a CC environment are « *valuable learning experiences* ».

We have to stress that most of the time CC is put on the same level than Computer-Mediated Communication, ignoring the fact that Computer Conferencing is only a particular application of the latter form of communication.

The following advantages try to integrate the different points of view from the authors above and to mirror our own vision of Computer Conferencing.

³⁴ Verdejo Felisa, Cerri Stefano, *Collaborative Dialogue Technologies in Distance Learning*, Springer-Verlag, Berlin, 1994, ISBN 3-540-58249-5.

³⁵ Kaye Anthony R., *Collaborative Learning Through Computer Conferencing - The Najaden Papers*, op.cit., p.122.

³⁶ *ibid.*, p.126

³⁷ *ibid.*, p.5-7

³⁸ Seidel Robert J., Chatelier Paul R., *Learning without Boundaries*, op.cit.

4.3.1 ASYNCHRONICITY

Asynchronicity basically allows discussions that are of a high-quality, which means that it is easier for students to respond to a question because they have more time to deeply reflect about the subject matter. Another characteristic of this type of communication is the encouragement of a self-paced (self-directed) learning, due to the « non-stop » open classroom.

4.3.2 PERMANENT TEXT RECORD OF DISCUSSION

Permanent text record of discussion is implemented by transcribing the whole set of comments from the participants. By doing so, learners get the opportunity to reread their argumentation and reconsider their previous work.

4.3.3 DISTANCE BENEFITS

In education, distance benefits for the Computer Conferencing are mostly the possibility to work at home. Being more comfortable, the learner is more concentrated and therefore achieves a better work.

4.3.4 ANONYMITY AND EQUALITY

Anonymity of the students' name, of their status and of their physical appearance through the use of pseudonyms enables them to remain unknown, thereby encouraging more frankness and truthfulness for the discussion, although pseudonyms allow control and monitoring.

Equality and democracy gives everyone an equal opportunity to contribute in the discussion, where the latter becomes less likely when dominated by one or two students.

4.3.5 COLLABORATIVE LEARNING

Collaborative learning enhances one's ability to communicate in a many-to-many manner and to keep a record of what has been discussed. It also brings together students in geographically dispersed locations and allows different sizes/mixes for grouping the students. Teaching and learning are made by group efforts and the collaborative learning method provides the ability to

get quick feedback from students at a distance.

4.3.6 REACH

Reach from a physical point of view is defined either on a national or international scale. When we consider a cognitive reach, then we can affirm that Computer Conferencing encourages the development of better writing skills. The learner is allowed to be the focus of the conference and thereby gets a feeling of control over his learning process. This again leads to increasing inputs and decreasing competition. Other positive effects are the facilitation of brainstorming and generation of new ideas. Finally, we feel that Computer Conferencing also gives us the possibility to easily bring in some guest lecturers and experts.

Many of these features are well-suited to the needs of the adult learner in the « information age. » We know that adult learners like to focus on current, real problems, want to be able to apply the knowledge or skill acquired immediately, learn best when involved and come to a course with a vast reservoir of knowledge to share. In addition, asynchronous Computer-Conferencing accommodates busy schedules and reduces interruptions. Finally, adult learners may have more of the essential attitudes of self-confidence, commitment, preparedness and self-direction that are important in a successful computer conference.

4.4 DISADVANTAGES OF COMPUTER CONFERENCING

As disadvantages are concerned, we will first approach some technical problems that are present in Computer Conferencing. These technical problems already emerge when a learner tries to log in. Most of the time, the user has to deal with a malfunctioning of the password-server. Difficulty of access also exists when a user does not have his own computer at home. Training the students to feel comfortable with Computer Conferencing systems may also demand too much class time.

Inside the discussion, we can encounter problems such as disjointed conversations, due to lag time between responses. Information overload may result from the redundant information inside the discussion because sometimes, there are many messages but no real interaction.

Since motivation is one of the most important issues in Computer Conferencing, a lack of nonverbal cues and lack of immediate feedback (or unpredictable lags in feedback) does in fact heavily penalize the system. Another point of low motivation is the impossibility to see the other students, which usually makes one feel more comfortable.

This in turn leads to confusion and feeling out of discussions, i.e. the student does not feel as being a part of the conferencing group.

Asynchronous Computer Conferencing may take more time to reach consensus in projects and tasks. Actually, there is no really good software for facilitating idea linking and idea structuring. The latter requires more administrative time and support.

Many of these disadvantages can be remedied by good instructional design and moderating skills. Creative designs can encourage interaction and acceptance of Computer Conferencing. Careful moderating can help pace discussion, tie together disjointed discussion, reduce overload and facilitate knowledge building.

However, this may come as a burden for teachers who have to spend some additional time before being able to benefit from Computer Conferencing. This attitude is illustrated by A. Kaye³⁹: « *Clearly, educators whose professional experience before using CMC is that of the traditional classroom teacher who tightly controls turn-taking, and who is perceived by students as the main source of expertise and knowledge, may have difficulty in adapting to the far more open and less controllable environment of computer-conferencing.* »

4.5 QUESTIONS OF SECURITY

Questions of security are a very important factor for the evaluation of the student's participation during their learning activity, when realizing the learning process throughout Computer-Mediated Communication technologies.

For the moment, we are in an era of network insecurity. Most of our applications run inside a network environment. Internet does not provide a secure system to implement an on-line

³⁹ Kaye Anthony R., *Collaborative Learning Through Computer Conferencing - The Najaden Papers*, op.cit, p.15.

course through Computer-Mediated Communication technologies. We have to briefly explain why the Internet is insecure !

Some major questions relevant to network security have to be raised :

1. How to know that the teacher is the message originator ?
2. How to know that the student is the message originator ?
3. How to know that the students are not cheating ?
4. How to be sure about the availability of the resources employed in Computer-Mediated Communication ?
5. How to know that messages sent will reach the right destination ?
6. How to protect information that is considered to be a professional secret ?
7. How to guarantee the identification of students who present an exam through Computer-Mediated Communication technologies ?

Security problems can be found at three different levels⁴⁰. Our aim is to protect people and the material they are working on, as well as their personal data. The issues here are the following:

1. Availability

Technology and resources need to be available whenever a group of « authorized » persons want to use them.

2. Integrity

Integrity implies the identification of the content and the origin of the messages (information) sent through a network.

3. Confidentiality

Confidentiality guarantees that the meaning of the information can only be understood by a particular person. These information can be represented as data, the material that contains it or

⁴⁰ Ramaekers J., Hubin J., « La sécurité Informatique », Facultés Universitaires Notre-Dame de la Paix, Institut d'Informatique, Namur, 1996.

even the knowledge some personnel has about their information network. Confidentiality aims at protecting a secret.

When we use Computer-Mediated Communication technologies, none of our traditional means of information protection remain guaranteed. Using the electronic mailing system is a common form of communication in a university. Sending messages to other students, asking them some questions about course work or contacting teachers are some situations in which everyone wants to be sure that the messages received are what they are supposed to be. Identity spoofing is a frequent problem when using the e-mail facility.

To illustrate this problem, we may give the following anecdote⁴¹ which shows how subtle an abuse of the mailing system can be.

Facing an entry examination for a US college, a student once wanted to secure his admission. Therefore, he posted a message to all the participants with the teacher's name as reference, stating that the date of examination was reported. Because his competitors did not show up for the examination, our student secured his admission without any problem. The other participants had confidence in the fake message and failed the examination because they simply did not take the exam when they were supposed to. The illustration shows that the abuse of the e-mail system was possible because the integrity protection constraint was not guaranteed.

In the same way, we face the need to protect our data and prevent an intruder for breaking into an unsecured network system, allowing him to steal professional secrets. However, there are a lot of tools that aim at protecting data against those eventual attacks. Cryptography⁴² is nowadays widely used to counter those problems.

During our training period at Virginia Tech, we noticed a problem with the availability of the resources used for the distance education system. One day, the main server at the computer science department, which contains all the necessary data for developing a course via WWW, was down. Unfortunately, it was impossible for many teachers to continue their lessons and

⁴¹ Ramaekers J., Hubin J., « La sécurité Informatique », *op.cit.*

⁴² Cryptography encrypts the original text using a game of keys; in this way the original text is unreadable for the persons who do not have the secret key for decrypting the text.

thus, most of the courses were rescheduled. How to avoid these kinds of problems? Talking to some local experts in charge of the network, it quickly appeared that the computer science department considered installing a second server in parallel, so that whenever there was a similar problem the other server could take over and replace the defective one. We think that experiences like these are very helpful if we want to implement on-line courses without running into big trouble.

Apart from these technological issues, we also have to pay full attention to the identification of the students who take on-line examinations. How to be sure that the right student is effectively taking a test ?

Traditional examinations usually rely on checking the student's identity card for authentication. Computer-Mediated Communication however does not allow this procedure. The distance constraint makes it impossible to check the identity and doubts may arise. Maybe in the future we may have some trustful identification methods, but the actual system does not provide a really satisfying approach. Until proof of the contrary, teachers need to have some degree of confidence in their students.

We may give a last illustration for this level of trust in students. When attending a course about telecommunications at Virginia Tech, the teacher gave some good advice for taking on-line examinations (e.g. the Quizit system). As a matter of fact, students were told not to let anyone have a glance at their computer screen when taking a test. Obviously, cheating is not desired but what can be expected when the teacher tells his class not to let anyone see each other's password. Clearly, no one wants his classmate to do the test for him, unless of course the classmate is known to be a « semi-genius ».

Security, in the areas cited above, did not seem to be a major issue at Virginia Tech. This can be explained when we consider that there are very strict rules and regulations, defining a honor code which states some serious consequences if a student really dares to use cheating methods. Occasional controls efficiently enforce this policy.

Finally, this quick presentation about security only aims at explaining the questions of security in an academic environment. Our thesis does not deal about network security but these fundamental questions had to be put forward at least once.

4.6 CONCLUSION

« The primary problem of implementing CC in a learning process is to overcome the problem of the social distance between learners and teachers, not just geographical distance »⁴³. This means that the interaction between the teachers become closer and more frequent, due to the everyday questions and interactions that the learners can have during the CC. In the traditional face-to-face classrooms, students prefer to participate only passively, where in CC classrooms the learners are in some way forced to participate. This forcing is the factor that allows to increase interactions between learners and teachers.

CC is likely to allow for much more openly structured curricula, thus not only reducing the production and storage costs that are traditionally associated with Distance Learning material, but also making possible much quicker updating and revision, and even individually tailored courses. In this respect, those technologies will be adjusted to the specific needs of the individual learner or learners group, what is becoming increasingly important - especially within the field of continuing vocational education and training.

In Computer Conferencing, successful collaboration occurs when discussion is structured so that groups are kept small in terms of numbers of participants and range of content, and people know fairly well what they have to do.

4.6.1 RATIONALE FOR USING COMPUTER CONFERENCING

Using Computer Conferencing can :

- improve understanding by allowing reflection – spreading the instruction over weeks
- improve mastery of subject matter by allowing more time to apply concepts
- facilitate the sharing of knowledge and experiences of other participants
- provide a way to experience a team approach to remediation problems

⁴³ Mason Robin and Kaye Anthony, *Mindweave, Communication, Computers and Distance Education*, (chapter5), Pergamon Press, New York, 1989, ISBN 0-08-037755-6.

- improve access to instructors and other experts in the field
- improve access for those unable to attend class for financial or other reasons

« Given the well-rehearsed constraints of face-to-face higher education, none of these benefits is available to traditional learners in the classroom or lecture hall. Nor is there any indication that face-to-face students find much time to work together outside class, certainly not with a large group of fellow-learners. They indeed complain that there is not even time or opportunity to get to know each other. The Computer Conferencing students, on the other hand, feel that they know each other very well indeed »⁴⁴.

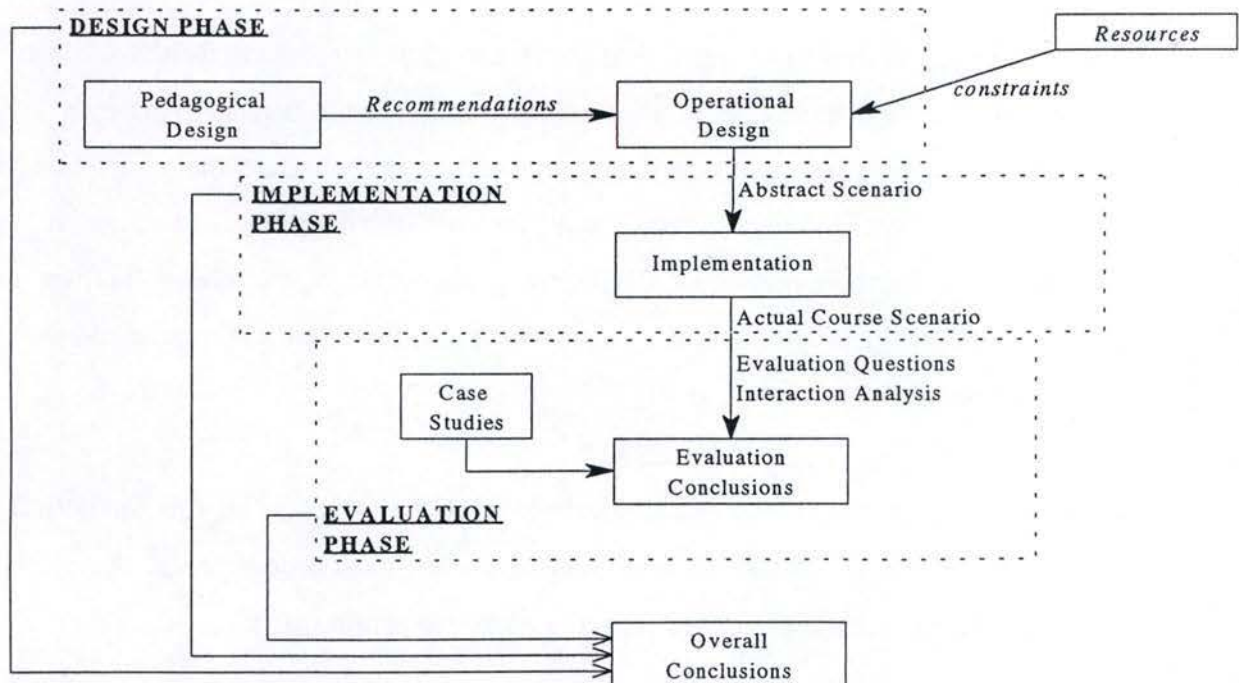
⁴⁴ Pincas Anita, « Why Computer Conferencing may help students more than face-to-face teaching », *op.cit.*

5. COMPUTER CONFERENCING COURSE SIMULATION

5.1 CONSTRUCTING OUR PROPOSAL

The main objective of this part of our dissertation is to propose an implementation of an on-line course and doing all the evaluation that seems necessary in order to conclude on the usefulness of Distance Learning at the computer science department.

Before giving some detailed explanations, the reader should have a look at our plan:



The plan contains three phases which are the design, implementation and evaluation. The initial design phase uses the pedagogical design to give recommendations to the operational design, which in turn has to consider the constraints that the existing infrastructure at the Computer Science Department imposes.

Before implementing our course, an abstract scenario is defined to allow a comparison with the actual scenario that details the conference how it really took place. The evaluation phase makes use of some case studies to facilitate the analysis of the interaction inside the conference.

We have to stress that inside every phase, there is always some evaluation which contributes to the development of the next phase. The overall conclusions are meant to incorporate the views of the three different phases.

5.1.1 DESIGN OF THE COMPUTER CONFERENCE

There are mainly two aspects that have to be considered for the design of an electronic computer conference. We think that it is particularly useful to approach the design of such a course first from the point of view of what should be done and then see what are the resources available for actually implementing the system (i.e. what can be done).

* **Pedagogical design** of the on-line course, without any regards for the software tool that can be used to realize the conference. It is important here to specify the type of discourse, which basically is asynchronous and to see what are the actual objectives, that means what kind of conversations do we want (the degree of interactivity has to be specified). Furthermore, concepts like the participation of a mediator, motivation for participation, privacy concerns,...etc. have to be discussed and predefined before a useful evaluation can be realized.

Predefining all sorts of goals and means is in general the core of this theoretical part (N.B. these specifications include defining the length of a conference, the number of people taking part in the experience, the cognitive profiles of the users, the objectives

of the teacher in charge of the course, everything that constitutes an environmental element).

* **Operational design** that takes into account our theoretical approach based on environmental requirements by making a link to the actual applications available. It is meant to be a synthesis of what should be done and what can be done. For example, the usefulness of a mediator participating in the computer conferencing process seems quite obvious. Hence, if we design a system that makes use of the newest version of an application that includes a chatroom facility, we are not sure whether a mediator is able to realize all the functionalities he is supposed to support (e.g. control of the dialogues and motivation of the users for example).

5.1.2 IMPLEMENTATION OF OUR DESIGN

This part can be quickly explained by stating that we try to organize an example of a course that makes use of computer conferencing. It should be particularly useful to put all the necessary informations related to this on-line course on the web (e.g. calendar, homepage with registration, accessing links,..., but also questions that will be asked for evaluation purposes).

*** Predefining a scenario**

It could be interesting to elaborate a scenario that describes how the course should take place from our point of view. This means that we specify how the course should ideally be held. However this also implies a certain degree of pragmatism. Things never work out like they are supposed to.

*** The actual course scenario**

In addition to the previously elaborated scenario we have to confront with reality and memorize how the course actually developed. Both scenarios are meant to be used in the following evaluation phase, where we will be able to acknowledge the divergence between the two scenarios.

5.1.3 EVALUATION

The evaluation phase should represent the core of our project. It is fundamental to know what are the potential benefits of an on-line course. Therefore, this part is structured in the following way:

1) Former CASE studies of on-line courses

What was done before and what were the conclusions from those studies. It is particularly interesting to analyze how certain group members in different environments reacted to a certain kind of computer conferencing (see, for example, the doctoral dissertation concerning an ethnographic study about learning by using CMC, where the author⁴⁵ illustrates his experiences with asynchronous dialogue).

2) Description and definition of a set of questions

The evaluation questions should be answered by the participating students after their computer conferencing experience in order to evaluate the course and their own contribution to the learning process. The set of questions should cover aspects like the level of difficulty for getting used to the system or the problems that occurred while interacting in a more or less homogenous group of people.

Besides, the evaluation questions could easily be put on the web by using HTML forms or even the Perl script language.

3) Analysis of the actual interactions

In this part, our focus lies on developing a better understanding of the group dynamics and see what type of interactions actually took place. This part is mainly based on the analytical model of France Henri⁴⁶ where we have five dimensions in a learning process. These five dimensions are based on messages that can be of the following type : participative, social, interactive, cognitive, metacognitive.

⁴⁵ Laughton Stuart Charles, *The design and use of Internet-Mediated Communication Applications in Education: An Ethnographic study*, op.cit.

⁴⁶ Kaye Anthony R., *Collaborative Learning Through Computer Conferencing - The Najaden Papers*, op.cit, p.125.

4) Observations and conclusions

Eventually, we have to confront our expectations with reality and try to elaborate some guidelines that might be helpful in future projects of this kind. These guidelines should add some practical value and not further explicit theoretical educational advice.

The conclusions are based on the questions that were predefined before and also take into account the scenarios previously mentioned.

5.1.4 OVERALL CONCLUSIONS

This latter part should include some personal experience and furnish additional reasons for the computer science department to consider using the type of education here specified.

5.1.5 THE SCENARIO OF THE PROPOSED LEARNING PROCESS

During the first phase of the learning process, the teacher comes up with a topic that has to be discussed and analyzed by the students which above the needed Internet references from their teacher have to do a search, as well as a resource localization. Having found and consulted these references, students will refer to their mediator (not necessarily the teacher) to launch the computer conference.

As the conference starts, the mediator has to supervise student participation, as well as the exchanged messages supposed to have an 'appropriate' content. The mediator also guarantees the guidance of these discussions. Students may use pseudonyms during their interaction / cooperation with each other. At the end of the computer conference which may last several days (a time span has to be set by the teacher), students will come up with a synthesis of their proposals which they will submit to their teacher. When receiving this synthesis, the teacher has to do a review and formulate some critics or simply accept the synthesis. Accepting implies that the teacher has to organize a final general discussion forum by using either another computer conference or simply throughout the traditional scheme of education.

We can refer at the figure 5.1. to illustrate the overall proposed learning process.

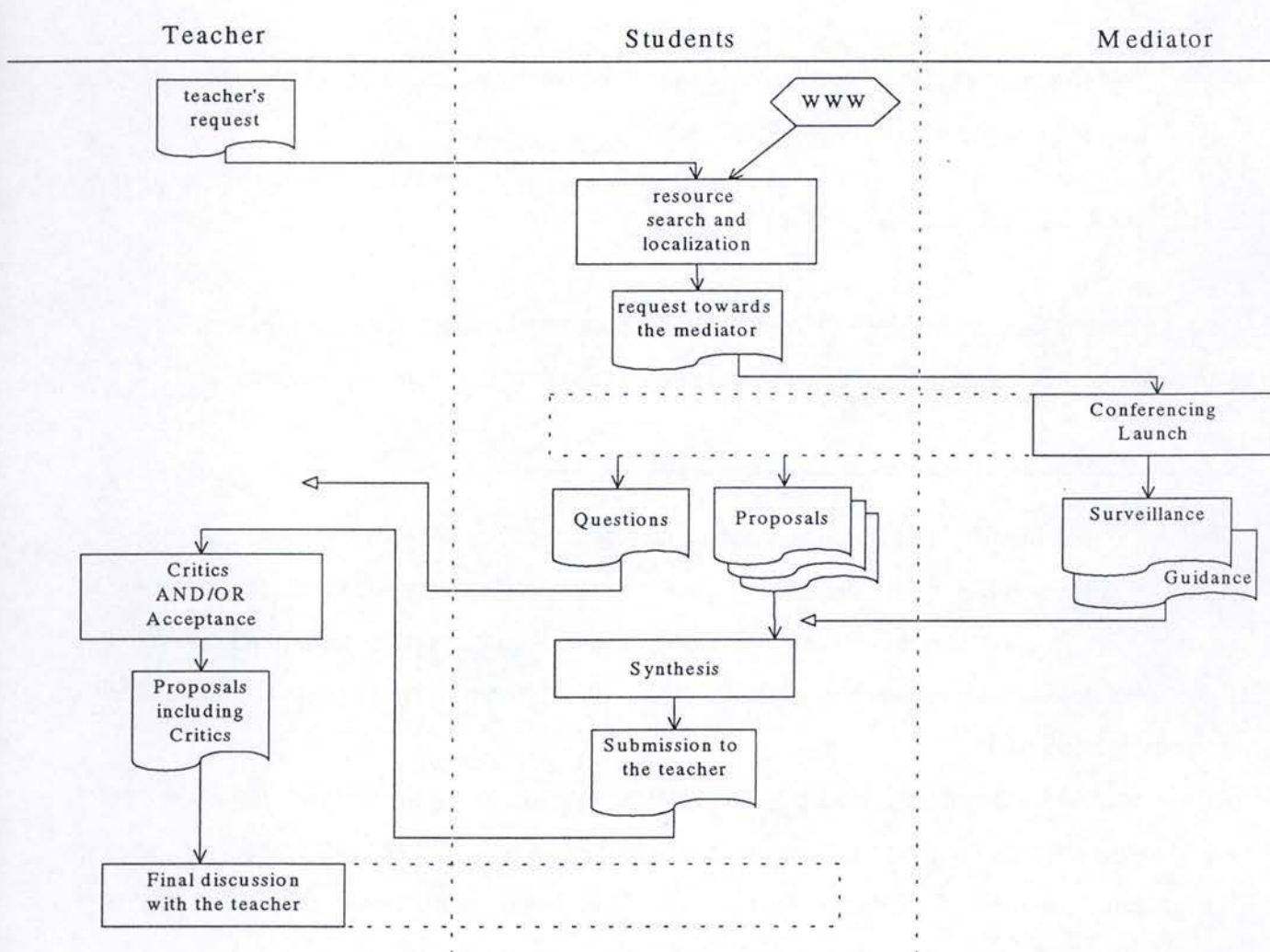


figure 5.1. Schema of the proposed learning process

5.2 PEDAGOGICAL DESIGN

5.2.1 INTRODUCTION

By designing an on-line course, we mainly wanted to show how useful the application of Distance Learning theory can be for our computer science department. Overcoming the boundaries of time and space is therefore our main objective. Nonetheless, this course is basically shaped towards the needs of any student who at some point doesn't feel comfortable with the traditional educational system, although we also try to incorporate as much as we can the needs and expectations of the teacher's view.

When discussing the implementation of a Distance Learning application, teachers in general come forward with the idea that they fear to lose control over the learning process and that they don't see how it is possible to effectively continue sharing their knowledge and foremost their lifelong experience with a group of students, throughout this very different way of teaching.

The control over the learning process should therefore be a major preoccupation when designing a course by using new means like computer-conferencing. It is really important to achieve at least as much as with the usual form of education but obviously this kind of Distance Learning must also add some value in order to justify its application.

As S. Laughton⁴⁷ puts it, we want to 'do more with less'. The idea behind this sentence is that by creating an on-line course, we consider the lack of time of all the students but intend to make use of computer-conferencing to achieve a better and more flexible learning. This means to decrease the amount of course material or to lessen the control of the teacher over his class while this will still be guaranteed when using Computer-Mediated Communication.

⁴⁷ Laughton Stuart Charles, *The design and use of Internet-Mediated Communication Applications in Education: An Ethnographic study*, op.cit.

5.2.2 USE OF COMPUTER-MEDIATED COMMUNICATION (CMC)⁴⁸

The design of our course is set up around the use of computer-mediated communication to promote a special form of learning , which is collaborative learning⁴⁹.

Because communication does not imply cooperation, we have to carefully design our on-line course so that an individual becomes part of a group and contributes through communication to the group objective, which in general is to come up with new ideas and put forward solutions to problems and given questions.

The Najaden Papers⁵⁰ provide an explanation for the difference which may exist between communication and collaboration. Even if learners are communicating, this does not imply that collaboration takes place. Each learner may only contribute some information or his opinion without actually seeking a consensus or working towards a common goal:

« Etymologically, to collaborate (co-labore) means to work together, which implies a concept of shared goals, and an explicit intention to 'add value' - to create something new or different through the collaboration, as opposed to simply exchanging information or passing on instructions »⁵¹.

5.2.3 TYPE OF DISCOURSE USED

Communication in our on-line course takes place by using a particular type of dialogue which is asynchronous communication. Again, it is important to see the difference between asynchronous and synchronous (or 'real-time').

⁴⁸ Stefano A.Cerri defines computer-mediated communication as a dialogue concerned with human-human communication at a distance by means of telecommunication network.

Verdejo Felisa, Cerri Stefano, *Collaborative Dialogue Technologies in Distance Learning*, op.cit., p.181.

⁴⁹ According to Anthony R. Kaye ,this form of learning can be defined as 'individual learning occurring as a result of group process' and more specifically the acquisition by individuals of knowledge, skills or attitudes occurring as the result of group interactions.

Kaye Anthony R., *Collaborative Learning Through Computer Conferencing - The Najaden Papers*, op.cit.

⁵⁰ *ibid.*

⁵¹ *ibid*, p.2.

Our understanding of asynchronous communication is that people do not necessarily have to communicate all at the same time. They can log into our system and do their work by asking questions or putting forward new ideas and comments. People are separated in time and still can work together.

5.2.4 OBJECTIVES OF ASYNCHRONOUS DISCOURSE

As one may easily guess that, allowing students to have a flexible learning schedule is most important. We want to achieve that the learner does not have to adapt his learning to a fixed and predefined course schedule. The student must have the possibility to do his learning when he thinks he has got the time for it. This implies a certain degree of responsibility from the part of the student, considering the fact that until now, a student always may choose to drop classes when he feels there is a lack of time for going to a class, instead of doing homework assignments.

But what are people actually supposed to be working on ?

5.2.5 SPECIFYING THE ON-LINE COURSE CONTENT

The course content is about « ethics of computing ». This topic was chosen because of a particular interest of our promoter⁵² and also mentor⁵³ (during our training period) in this domain. Selecting this topic also has the advantage of getting the students to review their knowledges about 'ethics' since we already had courses that mentioned problems related to ethics (in general but also applied to computer science).

Furthermore, it allows to do a better evaluation of the students' capacity of resource localization because the topic is general enough to find reference documents. In addition, when

⁵² Jacques Berleur s.j. (Facultés Universitaires Notre-Dame de la Paix)

⁵³ Dr J.A.N. Lee (Virginia Polytechnic Institute (VPI) and State University)

confronted to a large number of resources, students have to select the more appropriate ones. Hence, they are forced to search methodically, which of course implies having a closer look at the resources found during the search for information.

Besides specifying the topic of this course, we also have to define a certain number of questions related to the course material. This set of questions are put forward by the teacher and are meant to focus students on particular aspects of the course topic. The objective of our on-line course is to show that each student has in fact acquired a certain understanding of « ethics of computing » and therefore is able to answer the questions.

Finally, students need to get some information about our course. We therefore decided to make public this information by using the Internet. The content of these 'background' information is the following:

- Registration form that allows students to get a password for actually accessing the on-line course
- Calendar that clearly specifies when the course begins and at what date it ends
- Reference documents that provide a basic set of resources
- Questions that refer to the course topic

Clearly, the traditional hand-out paper sheets are being replaced by electronic data that is made available to a large public (i.e. not only the students participating in the on-line course can have a glance at the background information).

5.2.6 TEACHER'S SPECIFICATION OF THE ON-LINE COURSE

What follows are the course content requirements according to the teacher's view. This view can be used to define the pedagogical structure for the 'Ethics of computing' course content :

(A) HISTORICAL CONTEXT

In this first part we are mainly interested in the historical context of ethics of computing. But defining the core of the on-line course is very important too. The student should be able to explore the question why ethics might be a problem and also recognize if there is a difference between ethical and social issues of computing in society. Furthermore, the learner is expected to compare a series of textbooks or other relevant documents in order to be able to retrace their content structure (i.e. which issues are being considered all the time and therefore play a major role in the field of ethics).

(B) INDUCTIVE PART

Based on the historical considerations, the student now has to make the link towards our society and ask himself which ethical issues are important for everyone nowadays. Reasoning is a major factor and should help to relate ethics to the field of computer science.

(C) ETHICS COURSES ON THE INTERNET

Analyzing what is actually stored in Internet sites delivers a starting point for confronting the courses offered in ethics of computing. Hence, it would be interesting to take up a couple of links toward courses in ethics and do a comparison. The aim here is to see if issues like history of ethics or case studies are topics that show up all the time inside those on-line courses. The student is also invited to select case studies related to the topical issues.

(D) TOPICS SELECTIONS

As it is not possible to study in depth all the topics and issues, make a selection and negotiate it first between yourselves and then with the professor or mediator. The selection must include a general overview of the main theories of ethics, the hottest questions as identified in (A), (B) and (C), and some case studies which really exemplify these questions.

(E) THEORIES IN ETHICS

As soon as the selection is made and approved, the study must clearly explicit the problems and show where the ethical decisions are to be made. It also has to show which kind of orientation may be given, according to specific theoretical approaches, and propose different alternatives.

(F) ADDITIONAL QUESTIONS

The on-line course should contain a part dedicated to the study of different codes of ethics. The question to be answered here is to see whether these codes lead to a solution of the problems and issues as encountered in ethics of computing, and can help in solving the questions raised by the case studies.

5.2.7 MAJOR FACTORS IN CONFERENCING

Since the core of our on-line course is a computer conference, there is a certain amount of issues that have to be considered in depth.

Defining the number of participants in our conference is very important because this factor is linked to the needed time span that has to be set for the conference to last. We think that for a course at the FUNDP⁵⁴, it makes sense not to consider a class of no more than 30 people, since our university is a relative small one and classes never use to exceed 30 to 40 people. Dealing with a small group of people does in fact heavily influence the choice of an appropriate application for the computer conference. Fortunately, the size of our course does not impose for the university to do any major investments by spending a large amount of money on sophisticated computer conferencing 'software'. A small group of people like this one can be tutored with relatively simple means of Computer-Mediated Communication. However, the design of an on-line course needs to take into account the number of participating students and adapt the course design to it. This means in general to be more inventive on the group

⁵⁴ Facultés Universitaires Notre-Dame de la Paix

motivation. Students need to interact, to communicate and eventually to collaborate, which of course is more difficult to achieve with a small group of people.

But what about the length of a computer conference if already the number of participants is low ?

Well, it might appear that a smaller group needs longer time to settle down on solutions or to come up with appropriate ideas for answering the questions in the way the teacher wants them to be answered. This problem is once again linked to the lack of time available for the student to attend classes. A compromise has to be found between the length of the conference and the frequency students are entering the computer-conference.

We think that such a conference inside an on-line course should not exceed a time period of two months. It is important not to demotivate the students by insisting on a large time span and then running the risk of decreasing the number of participants due to disinterest or topic exhaustion⁵⁵.

Another important factor in conferencing is the cognitive profiles of the participants.

When we talk about cognitive profiles, it is the educational background that we are interested in. It really makes a difference when designing a course to take care about what we can expect from a learner, what prerequisites we can expect and therefore which degree of interactivity can be achieved.

Our on-line course has the privilege of only being in use by students who come from a computer science department. This allows a rather simple design because our learners do not need an exhaustive learning phase to get used to the conferencing system. Hence, we do not have to schedule a long time span for introducing the conferencing system and may use the time available for further computer conferencing discussion.

Now that we mentioned the discussion inside our conference, it is important to mention the need for organizing the interactivity between the students. The needed presence of a mediator

⁵⁵ The fact of having had enough discussion covering the topic in depth

inside a computer conference is a logical consequence of the discussion between learners because it must be guaranteed that the conversations between learners do not lead to « flaming » and that their content stays relevant to the topic that is supposed to be discussed.

One of the goals of our on-line course is to localize resource documents (i.e. informations concerning the topic of the course) and to communicate them to the other students. These resources are then used to get an insight of the course questions and everyone is expected to communicate and suggest possible answers.

It is clear that discussion can only emerge if everyone consulted the reference documents and understands what the course topic is all about. Otherwise, a student may not be able to follow and participate in any discussion.

When we talk about discussion, it quickly becomes obvious that a group of students needs to be accompanied by one or more persons in charge of the group dynamics. The presence of a mediator⁵⁶ is usually considered to be a necessity when organizing a computer conference.

Tutoring a class implies trying to offer a maximum of help and assistance so that the student feels comfortable and may effectively use the learning resources (i.e. our computer conferencing application). Apart from tutoring, there is also the concept of supervision which means that there must be some sort of control over what is being discussed inside the conference. Students are no angels and we must be aware that they might try to use the system as a form of chatroom. Our computer conference aims at supporting a learning process, not at providing a means of entertainment.

In addition to this, the concept of motivating also may be included in the role of a mediator. Enhancing the conferencing experience can only be guaranteed by giving students some kind of feedback about their learning process. Without knowing about how fine they are doing in their learning, students would not be sufficiently motivated to continue using the computer conference. Of course, this is a positive way of stimulating participation. We could also think of a more 'negative' way of forcing students to participate but this does not seem appropriate from a pedagogical point of view.

⁵⁶ We define a mediator as being a person who covers the functions of a tutor, a supervisor and a motivator.

A mediator in our system is supposed to be a teaching assistant or even a student who enjoys the trust of the teacher. It is not inconceivable that the teacher himself might want to act as a mediator for his class , but this is only an option and not a common practice.

Finally, if the teacher does not want to be part of the computer conference, what are his expectations then ?

Talking about a teacher's objectives is one of the most critical factors in designing an on-line course. At some point the teacher is the decision maker who has to decide upon using the possibilities of computer-mediated communication to add some value to his course. Our system is being designed for the needs of the students but there must be a 'win-win' situation for the teacher too.

In general, the objectives are that an on-line course helps freeing the teacher from time-consuming class meetings. This time can be better spent for doing research or reorganizing the content of the actual course. Hence, our on-line course must be dynamic enough to allow at any time major changes in the course content. Another objective might be that the teacher wants to make use of Distance Learning, so that not only the local students may profit from his knowledge and experience. Opening up and making the course available to the whole world would mean shifting from a closed university environment to a more open-learning oriented environment.

5.2.8 CONTROLLING THE LEARNING PROCESS

We realized that an on-line course has a certain content and that the quality of this content determines whether what we design will be a success or a failure. However, the major concern about designing an on-line course is not the content itself but the classroom dynamics. In what way do students communicate? What is their degree and type of interaction ? Are they really collaborating or does the system only favor individual learning ?

These are some basic questions that catch our attention when we talk about control of a learning process. Our analysis tries to make use of some ideas put forward by Winograd and Flores⁵⁷.

In their article, Winograd and Flores define an architecture of conversations which can be helpful for our design. Conversations are seen as « coherent sequences of language acts with a regular structure of expectations and completions ». For us, an expectation would be for example an answering proposal and a completion could be seen as the discussion and acceptance of that same proposal.

Similarly to these authors, we want to adapt our flow of information (materialized through the discussions) and coordinate them in order to get a better structured form of communication.

In that same context, T. Winograd talks about his principles of conversation management that helps people keep track of what is going on and what needs to be done. The author thinks that a basic conversation does in fact grow out of a request or offer that one person makes to another person. The same situation can be found in our computer conference, where one person makes proposals meant for initiating a discussion.

Hence, we want to specify a sort of protocol for interactions that aims at facilitating our evaluation phase. But to achieve coordinated discussion also means for us getting somehow a more collaborative learning process, that finally ends up with a more efficient way of answering the course content questions.

From a more general point of view, throughout structuring the discussion, we want to get a group of people working together towards a common goal and not having a set of individuals communicating only through the fact of putting forward a couple of proposals. Having a real discussion implies for us having all types of different conversations.

⁵⁷ Medina-Mora R., Winograd T., Flores R., Flores F., « The action workflow approach to workflow management technology », *CSCW Proceedings*, November 1992, p. 281-288.

See also

Winograd T., « Where the action is - Groupware brings clarity and simplicity to the coordination of human action », *Byte*, December 1988, p. 256-260.

Before giving our conversations architecture, let us first see how a computer-conference is organized inside the on-line course.

The conference mainly consists of a set of discussions, divided each into a multitude of messages, posted or received by the students. The on-line course therefore can be represented as a computer-conference to which are added some background information (which is the course materials, documents).

A simplified scheme of the computer-conference is given in figure 5.2:

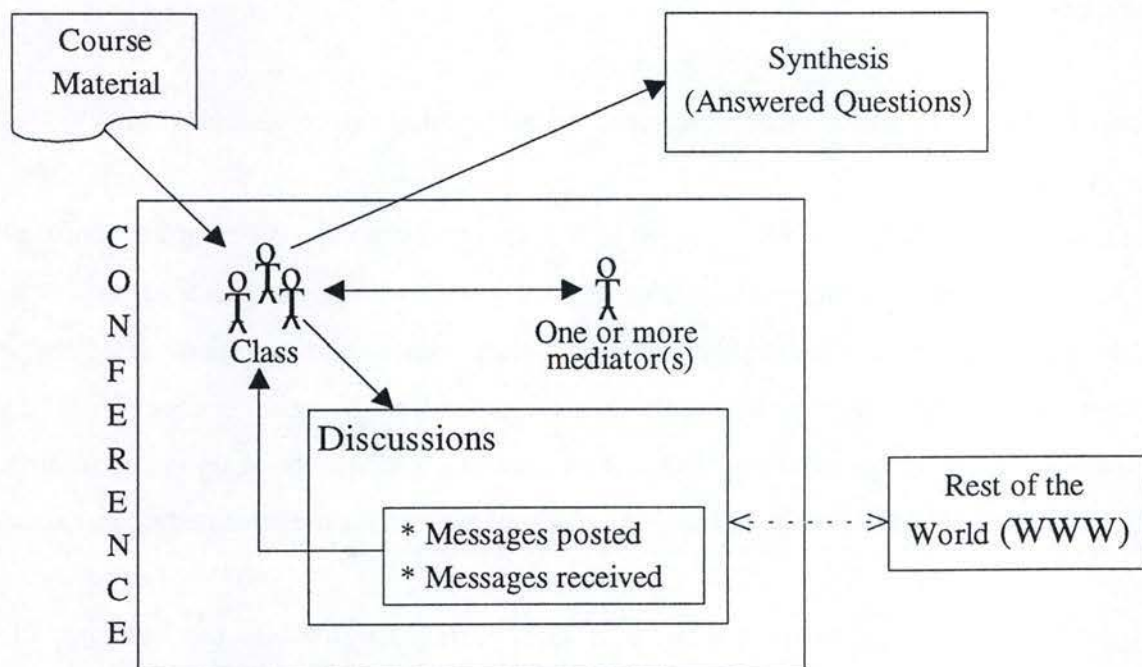


figure 5.2. The simplified schema of a Computer Conference

What is important is the architecture of the discussion. A discussion consists of a set of messages either posted or received. These messages in our design represent types of conversations.

Conversations can be of the following type or nature:

- proposal
- agreement
- disagreement
- critical review⁵⁸

The need for this « ambiguous » type of conversation which we call 'critical review' is given by S. Laughton in his case studies. It appears that sometimes students see a proposal but cannot really decide upon agreeing or disagreeing. In fact, a proposal can be a rather complex statement and a student might agree on some points but then disagree on others. Hence, we need a more or less neutral type of conversation which allows the learner not to settle down on a position.

How to relate this conversation architecture with our computer-conference design ?

In general, coordination is the key word in our design. By posting different kinds of messages, it becomes necessary to memorize the type of the given message and the discussion to which it belongs. In addition, we should also memorize when a particular discussion started and at what dates the students posted messages to keep the discussion going. This could be achieved by creating a database that saves all relevant information, which once again is important for our evaluation phase. The term of 'Conversations Database' will denote this particular database.

Apart from this memorizing process, it is as important to structure the sequence of every discussion and to highlight the development of this message interchange. It would be a good idea to create a sort of 'Discussion Process Manager' in charge of the structuring as seen previously.

Memorizing and structuring all sorts of information is the core of our conference architecture but the interface must also match the needs of the learner. When structuring the types of messages inside a discussion, we also need an « engine » that makes use of the structured

⁵⁸ A critical review is a kind of compromise between an agreement and disagreement

database and visualizes on the screen the messages in relation to that structure. We will call the module 'Interface Engine' that takes care of this functionality.

Figure 5.3⁵⁹ shows the architecture of our computer-conference related to the concepts of 'discussion' and 'conversation type'.

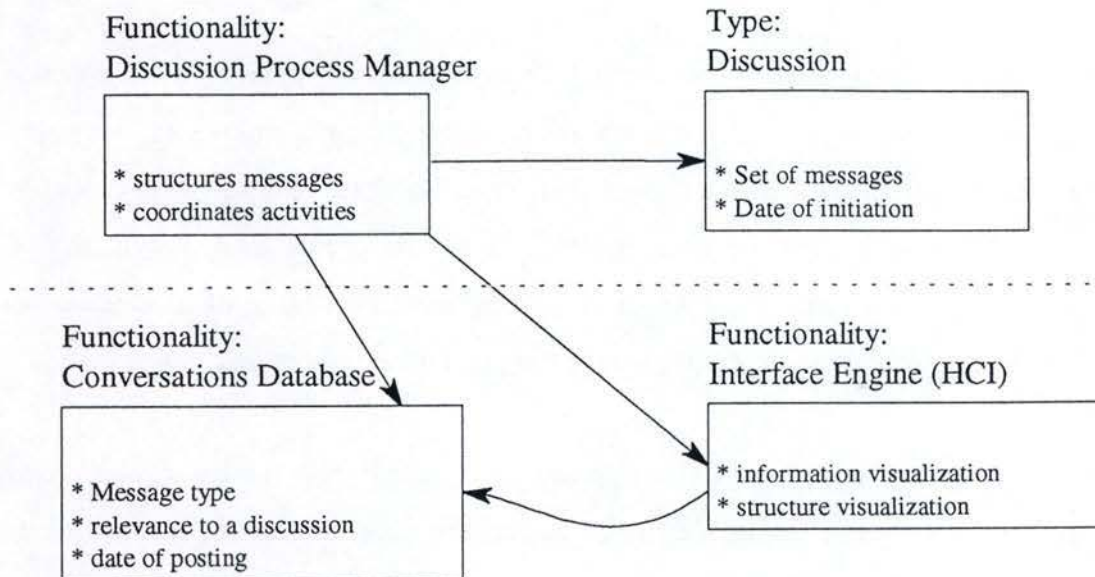


figure 5.3. Architecture of Computer Conferencing

This architecture uses the term of functionality which refer to a certain module (e.g. manager, database, human-computer interaction) but also introduces one structural type which is the discussion. It has to be said that figure 5.3 is a simplification in terms of software engineering and aims at increasing the readability of the explanations given previously.

5.2.9 A SUMMARY OF OUR DESIGNS' MAIN FEATURES

- computer-mediated asynchronous communication
- course content: « ethics of computing »
- electronic background information
- number of participants: 30 people
- background of participants: mostly computer science students

⁵⁹ The design of the previous figure was inspired by the principles of software engineering seen in '2ième Licence et Maîtrise en Informatique' with E.Dubois as teacher in charge of that course.

- length of the conference: two months
- presence of a mediator inside a computer conference
- availability for external learners
- management of classroom dynamics through a conversational model

5.3 OPERATIONAL DESIGN

Following the pedagogical design we are trying to develop the operational design that will allow the realization of a computer conferencing course simulation. We say « simulation » because there is only a small part i.e. equivalent to one chapter of a real course that will be developed. Hence, there will be some exceptions to the pedagogical design, due to the software used in CC course, the number of participants, the degree of motivation which is influenced by the fact that students are participating in a non-credit course etc.,...

The main objective in the pedagogical design was to overcome the boundaries such as time and space. In our case, we are limited only to overcome the time boundaries, because all the CC course simulation will take place in the Computer Science Department, and all the participants will be computer science students.

The CC course simulation will be done in a collaborative way. All the students need to cooperate between them, because at the end of the CC course simulation a synthesis will be made about the discussion relative to this course simulation.

The synthesis of the collaborative work will be done through synchronous computer-mediated communication, in this case we make an exception when we talk about overcoming time boundaries, but we think it is necessary that the final work needs to be synchronous.

Course Title

« Ethics of Computing »

Course Content

As the basis of our course content, we will take the first chapter that *Jacques Berleur s.j.* suggested to us in the *Teacher's specification of the on-line course* at section 5.2.6.

Participants must know exactly what they need to do. If they don't have such instructions, the CC course simulation maybe will not function as we want it to, because participants will be locked at their own will. However, CC needs a stimulus, same as for the traditional classroom. Participants should be able to explore the question why ethics might be a problem and also recognize if there is a difference between ethics and social issues or the problem of computers in society. The participants are expected to compare a series of textbooks or other relevant documents in order to be able to retrace their content structure. But these points are only a basic reflection because we will offer to the participants to be open on their topics, to find what is more interesting for them, keeping in mind the main points mentioned above. The experimental basis of the CC course simulation forces us to give to the students more flexibility on the choice of the approached topic. The flexibility factor will give us surely different results and interaction in comparison with traditional classrooms. The results can bring along positive or negative consequences for the learning process; we will have a look at this problem during the conferencing. We hope that flexibility will further stimulate the students, but it is possible that we will achieve the opposite.

Students geographic locations

Students will be generally from the University of Namur, the Department of Computer Science. The CC course simulation will be held in the computer-pools available at the Department, but it is obvious that the CC course simulation can be available from any place in the world, because we have put our software on the web server. For illustration, we didn't have the possibility to run our software written in CGI-Perl at our Department. Because we had already access to the server at Virginia Tech (VT) during our training period, more precisely the 'ei.cs.vt.edu' server at the Computer Science Department at VT, we installed our software over there and made use of all the possibilities that the software offers.

5.3.1 STRUCTURAL FACTORS

Media

The simulation of the course of « Ethics of Computing » would be a mixed-media Distance Education course lasting two weeks. The course will include World-Wide-Web presentation, printed materials and asynchronous computer conferencing and eventually synchronous computer conferencing.

5.3.2 COURSE TOPICS AND PROPOSED CONFERENCING ACTIVITIES

Week one (2nd week of April)

During the first day, the student is allowed to familiarize himself with the system and therefore is supposed to ask questions about anything he doubts about. After this short period of time, the actual course starts by discussing the given questions.

Week two (3rd week of April)

The main work of discussing and working out solutions is supposed to take place. After submitting a set of proposals to the teacher, the students now finally have to answer a couple of questions concerning their use of the conferencing system.

5.3.3 ORGANIZATIONAL FACTORS

Status : The course is offered on an experimental basis to help us evaluate the CMC techniques during the learning process.

Conferencing Software

WWWBoard Version 2.0⁶⁰ is the main software that we use during this course simulation. It is written in CGI-Perl (see Appendix C) and allows the students to use an asynchronous computer conferencing. WWWBoard will be used throughout the whole experience. All the information needed, i.e. previous discussions, current discussions etc,... to the participants is at hand via this software. Unfortunately, a password feature which could provide limited access

⁶⁰ Wright Matt, WWWBoard 2.0, <http://worldwidemart.com/scripts/readme/wwwboard.shtml>, March 1997.

to registered students (allowing them to participate in the CC course simulation) is not available yet.

Microsoft NetMeeting 1.0 is the second software that may will be used during the final discussion between the students. NetMeeting allows only real time interactions between the participants in the conference. The final discussion may be done in face-to-face meeting, but we have chosen to use an intermediate between the students, i.e. CMC, by means of which we are able to know the different types of reactions, and the learning degree that students have earned.

World Wide Web is used to allow the students an easy way for finding the necessary documents and materials needed for this experience. The links can be in 'html' format or document format.

Training in Conferencing

As the software is easy to use for computer science students, training is short. We familiarize the students during the first day, and allow them to ask all kinds of questions about software and the procedure of realizing this course simulation.

Course Development Timeline

The course development timeline is the first week of April 1997.

Course Assessment

The course simulation being proposed here would be a non-credit, continuous education course. Because of the experimental basis, the grading policy that defines on what basis the teacher will grade his students cannot be taken into consideration. This argument may be a reason of low motivation among the students.

Mediator

There are two mediators: in our case, we are the mediators. We try to keep the motivation high amongst students, guiding them to answer what is supposed to be answered and not to allow the students to do any discussion that are not necessary for the collaborative work. If

someone breaks up the rules of this course simulation, e.g. use of CC course for personal discussions, he will be excluded from the course, after deliberation between the mediators.

5.3.4 THE NUMBER OF STUDENTS

There are between five and ten students, interested in the topic of this course.

5.3.5 PROBLEMS AND CONSIDERATIONS

The question is how much participation there will be? Will the group be silent or will there be information overload? Without the incentive of grades or the ability to require participation in the conferences, the success of this course will depend on the students' motivation and need for this course.

The course moderator will need to encourage participation by setting the right tone and paying attention to the group well-being. The moderator will need to state clearly at the beginning of the course what the expectations for participation are and how students will benefit from the group activities. It might be possible to do some screening of students before enrolling to make sure of their level of interest and that they benefit from the material to be presented and discussed. Asking students about their particular interests at the outset of the course may suggest ways to group students for maximum participation for different topics of the course.

The course also depends on a highly-motivated course moderator or instructor. Coordinating the preparation of material before the course starts, learning moderating techniques, participating in a training conference and ensuring technical support will be time-consuming and probably without much reward from the department.

But in our case, the teacher does not participate, because this is only a course simulation on an experimental basis. At the same time, we play the role of the moderator, who guarantees the guidance and surveillance during the CC course simulation and replaces the teacher. We provide all the needed materials to the students, obviously with the help of our teacher. The necessary material is available directly on the web, i.e. we create a page that contains all the

links and references that the students need to read and discuss between them and with the mediators.

In the pedagogical design, we considered the creation of some kind of database. We don't need to create a database, because everything that is discussed will be accessible on the web, and in this case the web constitutes a database. At the same time, everything is structured and stored on the web. The visualization is made possible through the 'html' protocols.

5.3.6 ACTUAL COURSE SCENARIO

After having found the necessary software and tools to develop our CC course simulation, there are some deviations from our proposals made in the part 5.1 *Constructing our proposal* and 5.2 *Pedagogical Design*. This is due to the experimental nature of the CC, and the impossibility to find suitable software that can fulfill all the needs that we mentioned in our proposal for the CC course.

The teachers request in our simulation will be replaced by our call, to participate in our one or two week lasting computer simulation. The simulation covers only one part of the course program, for example the 'history of ethics', in which will participate 7 students but the number of participants is not limited in our case. It is obvious that this is only a simulation and the participation of the teacher is not necessary. However, we asked for direct help from our advisor to give us an idea about the conceptual design of the entire course program. However, we will try to fulfill one of the requirements mentioned in the conceptual design made in section 5.2.6. *Teacher's Specification of the on-line course*. It is clear that this is only a general view of the scenario about the computer conferencing that will be realized in the Computer Science Department at the University of Namur.

Computer Conferencing Resources

The computer conferencing will be realized directly on the web pages, where we have a main page⁶¹ that indicates what to do, and how to find the different links, references or documents needed to realize the CC.

⁶¹ Computer Conferencing, <http://www.info.fundp.ac.be/~bbitiki/CC.html>, April 1997 see also the html code in Appendix B

What else is found on the main page ?

One can also find a

1. Calendar that clearly specifies when the course begins and at what dates it ends
2. Questions that refer to the course topics

Concerning any possible questions about the research of links and documents, we based our approach on the idea from our advisor who suggested to use a « meta-browser » that allows for the participants to quickly find with a high level for selection the full amount of information that we have at our disposition on the Internet.

The realization of the « meta-browser » demands a lot of time, for which we are in a big need, but that we will not be able to develop the latter. However, we will detail later⁶² the possible construction of a « meta-browser », give the needed specification, the usefulness of the mentioned program etc. Hence, for the practical realization of the CC we will simulate the results of the « meta-browser ». The simulation of the « meta-browser » will give to the participants an entire page with categorized links and references, that we have already found on the web, and others furnished by our advisor, with what, the research is easier to realize and for which we don't need to spend some extra time. Sequence of the events is given in figure 5.4.

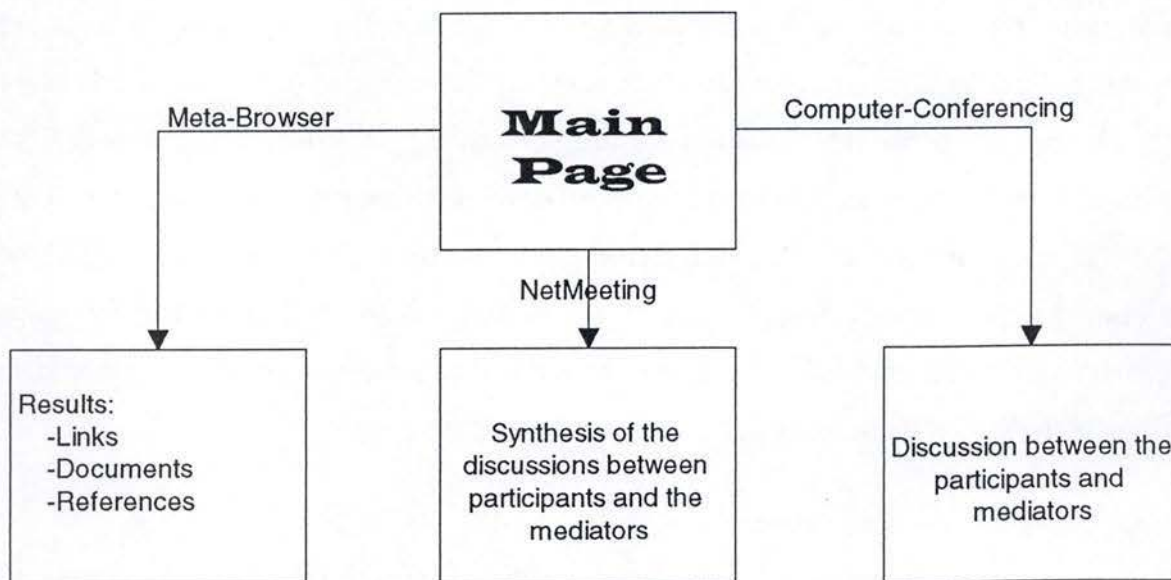


figure 5.4. The graphical view of the practical development of the course simulation

⁶² For a more detailed approach of what the meta-browser could be, we will discuss this at point 5.4. Prospect: Facilitating the Information Research

After having read the necessary documents, the participants begin the real process of computer conferencing with the activation of the WWWBoard application, which allows an asynchronous conferencing between participants. This aims at decreasing as far as possible the time planification, i.e. the participation on the CC whenever the participants have time.

The WWWBoard conferencing lasts one week, in which participants give their point of view and a solution to each other. This phase normally requires to have an interaction between the participants and the mediator and from time to time with the teacher. We have made abstraction of this interaction between the participants and the teacher. Furthermore, the interaction between participants and mediators is brought down to a minimum. For the first one, we made an abstraction because the teacher is not participating in this simulation, and the latter one, because of the non expertise of the mediators on the CC simulation for the part of the course that we proposed.

During the discussions, we play the role of mediators, and we are charged to do the surveillance as well as the guidance. If somebody is out of context with his messages, we try to bring him back to the real topic, or we try to stimulate as much as possible the participants to communicate with each other.

After finishing the discussion, the synthesis of what was discussed becomes necessary. For the synthesis, we can continue to use the asynchronous conference, or if the participants want, we can use NetMeeting, which is synchronous conferencing, with the possibility of program sharing. That means that they can use at the same moment for example Word 7.0 and everybody can participate in composing the synthesis. If not, they only propose what is necessary to state in the synthesis, and the mediators gather the information to make a summary.

The summary normally is expected to be transmitted to the teacher. In this case, we do not proceed in the expected way, but we make the final discussion with NetMeeting to accept the final synthesis, ending the CC course simulation. Figure 5.1 is transformed into figure 5.5.

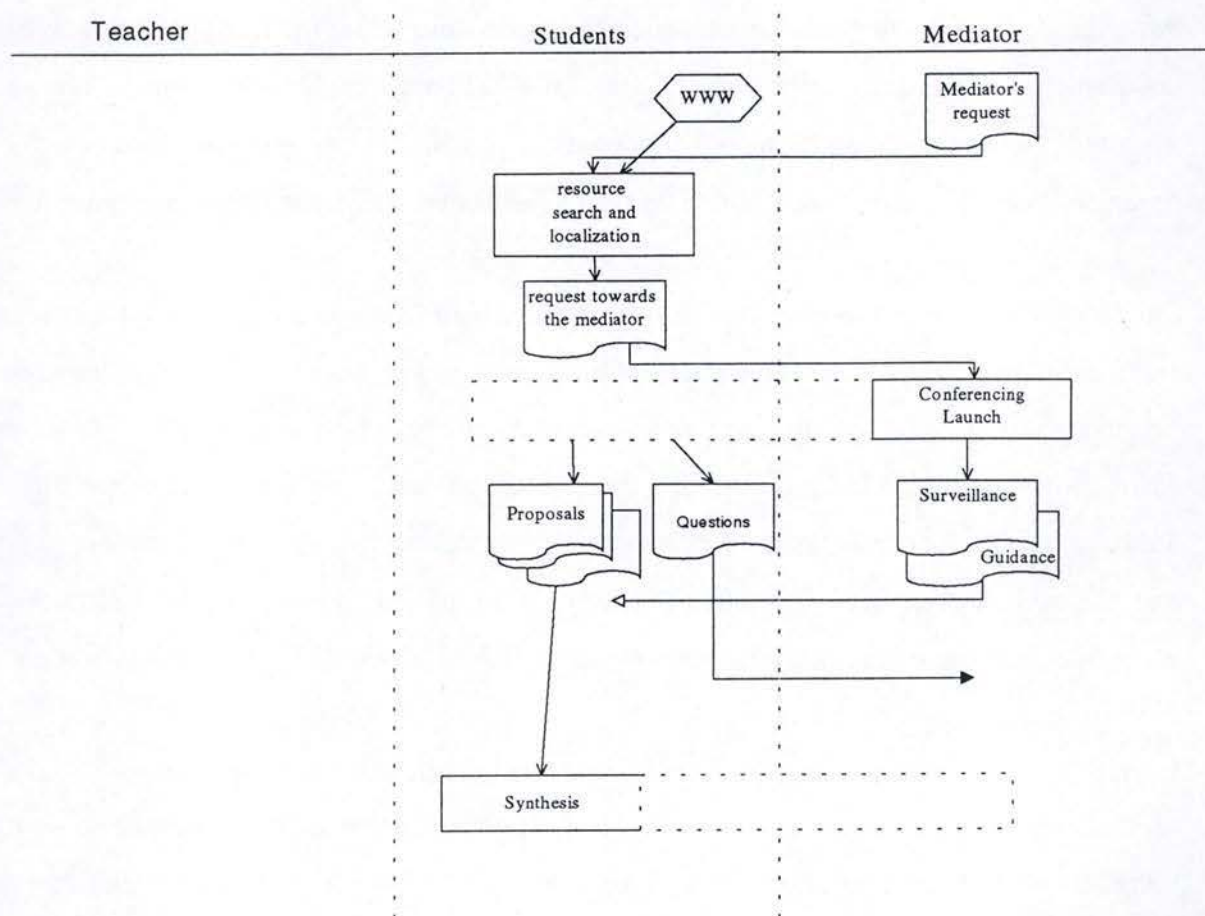


figure 5.5. The flow of information for the CC course simulation

5.4 PROSPECT: FACILITATING THE INFORMATION RESEARCH

5.4.1 THE CREATION OF A META-BROWSER

5.4.1.1 Introduction

When we discussed our intention of realizing an on-line course, the idea came up that it is necessary to create new tools which aim at facilitating the learning process. At that time, an important issue seemed to be the definition of a meta-browser. This tool would modify the information research and localization phase and therefore smoothen the process of finding the relevant resources for the on-line course.

Using the Internet to find the right documents is sometimes a very complicated procedure. The problem mainly consists in selecting the appropriate links to different hypermedia documents that do not necessarily contain all the relevant information. If one does nowadays a search on a key concept, it usually happens that the result of this research is a list of thousands of links towards homepages that mostly are inappropriate. A lack of structure and information in the presentation of the resulting links best describes what we get out of a common Internet-browser. The user literally gets lost when looking for the right documents.

5.4.1.2 Some common problems

In general, Internet-browsers make use of the three following techniques⁶³:

- Storage
- Retrieval
- Indexation

The links found on the Internet are usually stored into an index. This indexing function is important because there has to be a strategy defining the way in which new or updated web-pages are stored into the database. It seems obvious that a retrieval function is required. The links retrieved from the database are thought to match the user queries.

Matching the queries with the indexed terms inside a database is far from being an easy task, since there is a particular difficulty called « the vocabulary problem ». Numerous ways for describing similar ideas exist when using natural language (which of course is done in a user query). Just consider the example of « ethics inside the field of computer science ». What follows, is a non-exhaustive list of expressions that might be used in a query:

1. Computer Ethics
2. Ethics in Computing

⁶³ Multi-Service Search and Comparison using the MetaCrawler,
<http://www.w3.org/pub/Conferences/WWW4/Papers/169/>, March 1997.

3. Ethics of Computing
4. Computers and Ethics

For instance, we may give a table that shows the results⁶⁴(i.e. the number of matches returned) of some common Internet-browsers when doing a research on the four terms given previously. There is a recent browser called 'Meta-Crawler'⁶⁵ which does a combined search by using the services of the Internet-browsers mentioned below. This provides some further ease of use but does not really introduce a new search method.

The figures in 'italics' are obtained when applying a specific search strategy like searching for a complete sentence and not doing a search on each single word.

	<u>Lycos</u>	<u>Yahoo</u>	<u>Excite</u>	<u>Altavista</u>	<u>Infoseek</u>
Term 1.	40,149	20	2,151,690	100,000	2,173
+ <i>strategy</i>	<i>80</i>	<i>9</i>	<i>1,780</i>	<i>1,000</i>	<i>2,173</i>
Term 2.	40,101	3	632,190	100,000	6,697,782
+ <i>strategy</i>	<i>76</i>	<i>289</i>	<i>293</i>	<i>100</i>	<i>193</i>
Term 3.	40,101	3	632,190	100,000	18,862,339
+ <i>strategy</i>	<i>76</i>	<i>43</i>	<i>293</i>	<i>28</i>	<i>29</i>
Term 4.	40,094	8	750,651	100,000	23,008,804
+ <i>strategy</i>	<i>61</i>	<i>35</i>	<i>239</i>	<i>24</i>	<i>46</i>

It becomes clear that a user who does not carefully choose his vocabulary has no chance to obtain a satisfying query result. The problem is even worsened by the fact that all the web-pages returned by the browser do not necessarily represent relevant pages. Hence, the most appropriate links are frequently missing.

Actually, there are two major strategies employed by all the different Internet-browsers. Providing a sort of « Yellow Pages » service is a very popular idea, where a huge database is established. The most common links found on the Internet are stored into categories. Unfortunately, the « vocabulary problem » is particularly troublesome for this kind of service. The alternative consists in a keyword content-based search that looks through all the web-

⁶⁴ Search done on 26th of May 1997

pages by comparing the content to the query. We have to realize that the services provided by all the different Internet-browsers only give us an incomplete picture of what is actually available on the Internet. Every browser has its own interface and database which only covers a certain portion of the World-Wide Web.

How can we remedy to this situation and avoid having too many matchings for a key concept that we are searching for ?

5.4.1.3 Defining the 'META' concept

Introducing a new form of a browser implies the creation of an additional level of abstraction to the information research. This level of abstraction is located above the level which defines the actual set of relevant key concepts. Adding a level of abstraction to the actual structure provides a way for the user to restrain his information research and concentrate his efforts on looking for relevant documents inside a particular domain.

Understanding what our new 'meta-level' represents is not straightforward. Hence, we will give an example to illustrate this new concept.

Consider, once again, that you are a student who has to look for resources inside the field of ethics. The student is interested in « ethics of computing » but finds himself trapped by the browser which offers for example three thousand matchings to documents in connection with ethics. The student now has two alternatives:

- randomizing his search and selecting a couple of documents that seem to contain information about 'ethics of computing'.
- browsing through all the documents that appear as a result from the traditional browser.

The first solution is commonly applied by every reasonable user. But what about the alternative to this random process of consulting documents ? It would be unreal to believe that it is

⁶⁵ Multi-Service Search and Comparison using the MetaCrawler, *op.cit.*

possible to have a look at all the documents (which again contain links to other documents that might not be in relation with our target concept).

Before introducing a meta-level to the information research, a tree-structure of the resulting documents might appear as the following:

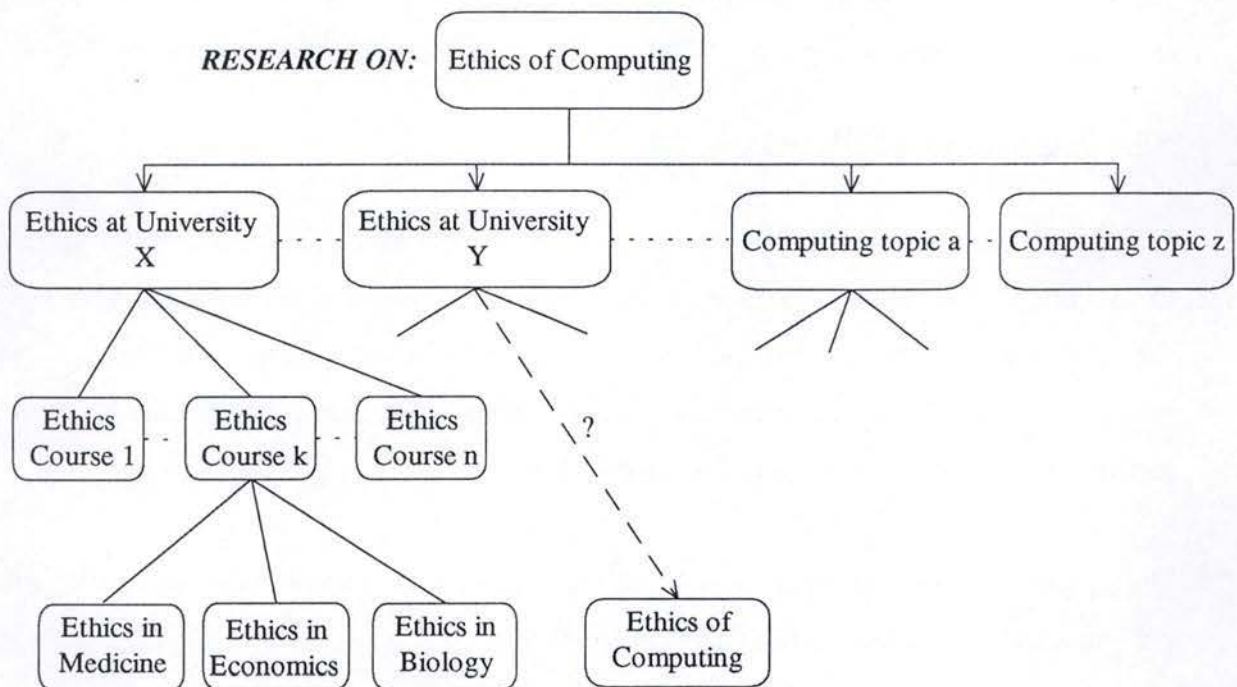


figure 5.6. Tree-structure before using a Meta-browser

This graph (see figure 5.6) shows that when doing a research based on a key-concept technique⁶⁶, the traditional browser does a pattern-matching between the concept and the words found in different hypermedia documents on the Internet. The links that result from this search are most of the time too general. We do not get a category of links that only contain the appropriate documents. In our example, 'Ethics at University X' does not at all contain 'Ethics of computing'. Already, this requires the user to jump from one homepage to the other to realize that 'university X' does not offer an appropriate course on that topic. Furthermore, who guarantees that the next link, for example 'Ethics at University Y' may finally have relevant information ?

⁶⁶ This service is currently provided by every Internet-browser

This way of doing a research requires a lot of patience and time from the part of the user and without a good search strategy or a certain knowledge of what has to be found, the task to look for resource documents becomes an impossible mission.

If a meta-level was put on top of this graph, the changes could be rather dramatic. This meta-level can be seen as a form of knowledge-base which contains the semantically appropriate terms in relation to a certain concept. Again, to illustrate this idea, let us have a look at the modified graph (see figure 5.7) that includes our meta-level.

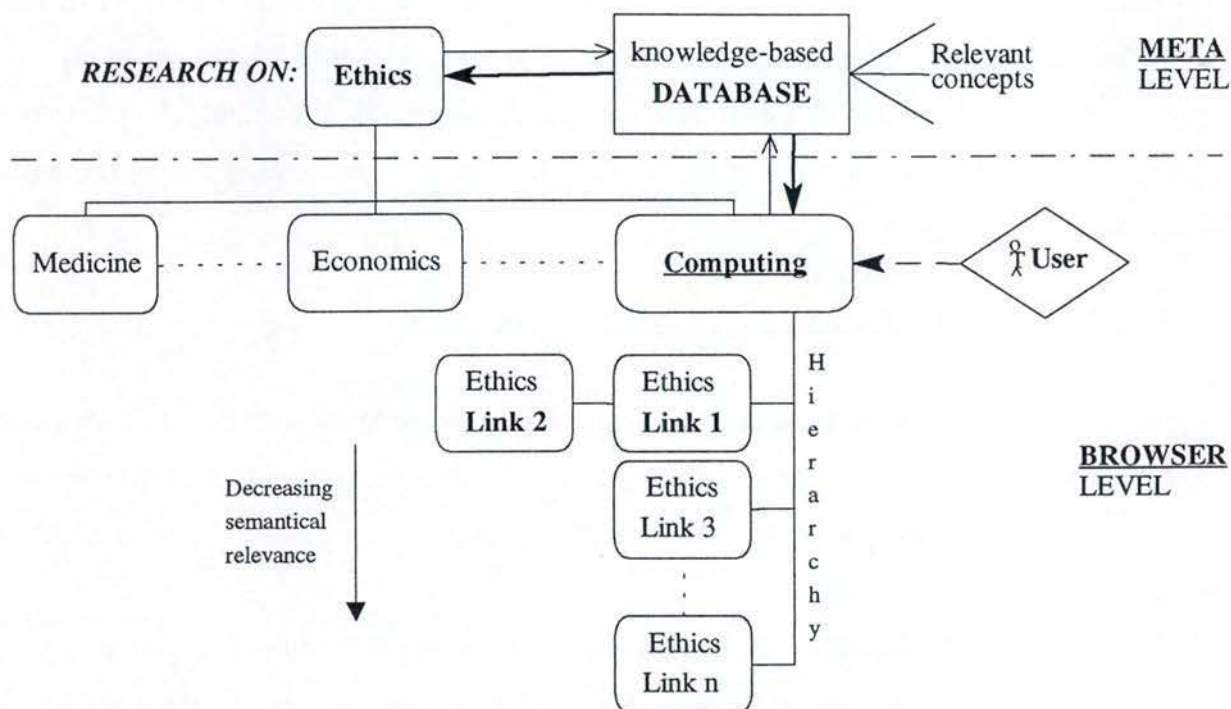


figure 5.7 Tree-structure when using a Meta-browser

What are the differences with the previous graph ?

This time, our research is done on a general term like 'Ethics'. We start from the hypothesis that our meta-browser is not case-sensitive and therefore returns a meta-list⁶⁷ of categories inside the field of 'Ethics'. To each field are attached a set of terms that all share a direct semantic relevance. All the user has to do, is selecting the field of research inside the given meta-list. We now step down to the « Browser level » and a traditional search is done on the terms specified inside our knowledge-base.

⁶⁷ We define the term of meta-list as 'a list providing a categorization of terms inside a particular domain'.

The results are presented in a way that first appear those links which best meet the requirement of a semantic relation to the terms found in the knowledge-base. Hence, the following links decreasingly satisfy to this constraint and become part of a hierarchy. It could be useful to let the user choose at some point the depth of this hierarchy (i.e. limit the number of links returned by fixing a minimum degree of semantic relevance).

It now appears that the database at the meta-level contains a set of general concepts. Each one containing a subset of concepts that share a semantic link with the concept specified at the meta-level. Implementing this system would require to apply certain methods of the 'Information Storage and Retrieval' domain⁶⁸. Furthermore, this also implies the creation of an expert system that uses techniques of 'Artificial Intelligence' for allowing a constant update of the knowledge-base.

5.4.1.4 Illustrating the need for introducing a meta-level

Let us try to illustrate the need for organizing and categorizing the data found on the Internet. Before the idea of a meta-browser emerged, our advisor delivered to us some twenty links which he thought were relevant to 'Ethics of Computing'.

We then did a little study which consisted in browsing through those twenty links and observing any major features of those web-pages. A complete list of the links with our additional comments can be found in Appendix A. Those comments mainly focus on the language used in the web-pages, the inherent structure of the page and its links, as well as some general observations.

All pages analyzed are held in English. Although this is not surprising, most web-pages usually contain English titles but still may have their content in a foreign language. Concerning the geographical location of those sample pages, 90 % were found inside the top-level domains 'edu' or 'com'. We cannot draw a conclusion from this observation, like stating that for a certain topic the American continent is a significant environment or location, but it could be

⁶⁸ Fox Edward, Information Storage and Retrieval, Virginia Polytechnic Institute and State University, <http://ei.cs.vt.edu/~cs5604/>, September 1996.

somehow interesting to draw a geographical map of the relevant links to visualize « hotspots » on the Internet.

Talking about the connectivity of these web-pages, this basically is a subjective appreciation from our part. We consider that a web-page has a high connectivity when its content mostly consists of links pointing towards other web-pages. In our case, we noticed that 35% of the pages had a high level of connectivity. Low-connectivity pages were those that only contained mere plain text and no links towards other web-sites. Hence, one third of the pages fits into this category.

Another interesting feature analyzed was the hierarchical presentation of any links inside the web-pages. Forty percent of the links were in fact given without any noticeable structure. Another thirty-five percent presented their links using a partial order (e.g. alphabetically ordered, by universities/courses, countries/topics,...etc.). Only a minority of the pages (i.e. 5%) presented the links by using a strict order like structuring them inside categories, which comes close to the definition of meta-lists.

Having a look at our statistics shows that there is a real need for more structuring and categorization inside the relevant homepages. The homepage that best presented its content was the one which used a table, containing all sorts of general concepts inside the field of 'Ethics of Computing'. However, an additional alphabetical order on the categories would have been more ergonomic for the presentation.

Finally, we have to put forward an observation that somehow is troublesome. A certain number of links towards our resources documents changed after a short period of time. Sometimes, these documents were relocated to other sites and the user was explicitly informed, whereas most of the time, the link simply stopped to exist without any kind of notification. Managing the persistence of our resources documents becomes therefore a major issue and should be included as a functionality in systems that offer services comparable to those of a Digital Library (N.B.: the concept of 'Digital Library' will be explained later).

5.4.2 USING THE RIGHT TOOLS TO ENHANCE A META-BROWSER

5.4.2.1 Visualization of WWW-pages

We think that it is particularly interesting to mention some other work done in the field of Internet-browsers. In particular, we will now describe the « WebQuery⁶⁹ » system, which uses a new method based on connectivity and content of web-pages.

The system actually examines the links among the nodes returned in a keyword-based query. In addition, an algorithm is used to rank those nodes by their degree of connectivity⁷⁰. These techniques are therefore best described by saying that « WebQuery » tries to locate « hot spots » on the Internet. The actual visualization method is employed to filter out only the interesting and appropriate links returned by the browser. Visualization techniques range from two-dimensional up to three-dimensional graphical representations.

Most important, the creators of this browser founded their work on a hypothesis, which says that people form communication « clusters » on the Internet and reference each other in their web-pages. Analyzing the connectivity therefore enables the browser to locate these communication clusters. « WebQuery », which uses content and structure-based queries, is described by its authors in the following way:

« By relying on the human web, as both a filter and an augments of text-based searches, we are able to find important sites quickly and dramatically. »

The « WebQuery » does in fact use the services of several web-browsers available on the Internet to collect in parallel the results from these different search engines. Besides the computation of the most highly connected nodes, this system mainly uses visualization as a last step to filter out irrelevant web-pages by not graphically representing them at all, or at least putting them on the outlines of the screen. The center of the graphical representation is thought

⁶⁹ WebQuery: Searching and Visualizing the Web through Connectivity,
<http://www.cgl.uwaterloo.ca/Vanish/webquery-1.html>, March 1997.

⁷⁰ Connectivity refers to the number of links pointing towards a node, plus the number of pointers referencing other nodes.

to contain the most important links. Visualization does in fact provide some interaction with the user, since he still has to find the 'important links' by selecting them inside the visualization, which of course facilitates this task.

We think that this visualization technique could also be included to our meta-browser and provide some valuable support to any search engine, always trying to facilitate the task of the user who has to find relevant information on the Internet.

5.4.2.2 The usefulness of Digital Libraries⁷¹

As everyone agrees, any type of information can be found on the Internet. Unfortunately, the value of this powerful resource is considerably diminished by its lack of well structured and presented data. The question is : How to integrate the world-wide availability of documents and the advantages of a traditional library which stands for high quality documents, stored by categories and available on-demand, through interaction with a well-trained person ?

Digital Libraries are thought to consolidate all these advantages. They are meant to be a special location on the Internet, where only resources relevant to a particular domain or topic are indexed and hyperlinked to the actual Internet documents or services. To some extreme, one's personal browser-bookmarks represent a Digital Library but we will not take into account this point of view.

Let us have a look at how Dr. Fox from Virginia Tech sees the emergence of Digital Libraries:

« Improvements in storage technology and computer networks have made possible the creation of collections of articles, books, multimedia documents, and other results of an emerging electronic publishing industry. Advances in information access theory, techniques, and systems allow these collections to become easily accessible for searching, browsing, reading, research, and re-use - transforming them into value-added digital libraries. »

⁷¹ Digital Libraries in CoNDUIT, <http://www.sme.org./conduit/news/complete/cdn14.html>, March 1997.

See also

Fox Edward, Building and Applying Digital Libraries, Virginia Polytechnic Institute and State University, <http://ei.cs.vt.edu/~fox/SIGIR96/Outline.html>, March 1997.

Many projects were undertaken during these recent years, to enhance the actual information services and make them more effective but also efficient. These projects were mainly funded by organizations like NSF (National Science Foundation), NASA (National Aeronautics and Space Administration) or ARPA (Advanced Research Projects Agency) in order to improve the means of collecting, storing and organizing information in digital forms.

Digital Libraries are so important because they do not only represent piles of documents but add powerful services (i.e. multi-media services, structuring and retrieval services) to the common concept of a library.

Even some critical aspects like privacy, content integrity or rights management are challenged today by organizations as prominent as represented by IBM. Privacy could be an issue for universities or organizations which want to restrict access to their digital library. Content integrity and rights management (cfr. problem of guaranteeing the copyright) are well-known constraints for traditional libraries. These concepts can be preserved by using techniques like electronic signatures or encryption methods.

We think that Digital Libraries can usefully enhance and support our Distance Learning efforts. They centralize, categorize and also standardize the presentation of electronic information, which again goes into the same direction as the creation of a meta-browser. To illustrate this position, let us quote how IBM⁷² states the goals of their own Digital Library in the field of Higher Education.

« The concept of a school without walls has been discussed for over a century. By setting the stage for Distance Learning and access to learning archives, both using multiple forms of media, IBM's Digital Library finally makes the 'open classroom' truly open. All the important documents can be available on-line twenty-four hours a day, seven days a week. »

⁷² IBM Digital Library, Explore IBM Digital Library On A Case By Case Basis,
<http://204.146.47.71:80/is/dig-lib/dllis.htm>, July 1996

5.4.3 CONCLUSION

Most so-called available meta-browsers heavily rely on simple databases and do not effectively add new features to information storage and retrieval. Rather, they combine the services offered by traditional browsers to extend the set of links returned.

Apart from this fact, we think that the 'meta' terminology is frequently used abusively, without a deeper understanding of this expression. Although 'meta-lists' exist on the Internet, they provide the important categorization factor but remain static constructs, which do not result from an interaction with the user.

We based our analysis on a particular example (i.e. the field of 'ethics of computing'). Although reasoning on examples is quite empirical, we think that everything we said can be generalized and therefore is applicable to other domains.

Our final conclusion is, that the task of facilitating the current information research can only be achieved through the use of Digital Libraries, the creation of an effective meta-browser and the provision of ergonomically designed user interfaces (i.e. using appropriate visualization techniques). Concerning the prospective creation of a meta-browser, we have to underline that there are already some research projects⁷³ trying to find appropriate ways of developing 'content oriented information systems'. These systems try « *bring a solution to the problems of disorientation and cognitive overhead in navigation* »⁷⁴.

⁷³ Noirhomme M., Serpe V., HyperNavi - Design of graphical navigation aids for hypermedia, <http://www.info.fundp.ac.be/~cri/DOCS/interface.html>, May 1997.

⁷⁴ *ibid.*

6. BACKGROUND FOR THE EVALUATION PHASE

6.1 INTRODUCTION

In order to realize an efficient evaluation, we have to first consider some case study results that may help us to do comparisons with our own evaluation results. These comparisons then allow us to come up with general guidelines that may orient future Distance Learning projects.

6.2 CASE STUDY 1 : THE CoSy SYSTEM

The following explanations are based on the CITE Paper No.91⁷⁵. This paper contains a collection of several case-studies that may help to understand the implications of using a computer-conferencing system. Most of the conclusions of these studies resulted from the use of the CoSy⁷⁶ application. Therefore, we will first give a brief outline of this system.

A metaphor used for the CoSy system is usually the picture of a writer's desktop with all the tools that are relevant to this metaphor. An important feature is the 'scratchpad' where messages may be edited on-line. Furthermore, there are the usual tools like an e-mail facility, a conversation space (designed for unstructured discussions inside a small group of people) as

⁷⁵ Keynes Milton, « The Open University », Centre for Information Technology in Education (CITE), Institute of Educational Technology, October 1989.

⁷⁶ which stands for Conferencing System

well as a conference which is similar to a forum⁷⁷. The conference may take place under the form of a public conference, accessible to everybody. Private conferences are however possible and therefore require the permission of the conference initiator who decides whether or not allowing someone to participate.

The CoSy system was mainly used to support CMC⁷⁸. Computer-mediated communication is actually seen as a tool for supporting administrative tasks, academic collaboration and also teaching.

In an administrative environment, CMC was used by institutes like Guelph University⁷⁹ (N.B. the actual originator of the CoSy system) or the Ontario Ministry of Community and Social Services⁸⁰.

CoSy actually provides support for the tasks of brainstorming, setting goals and objectives or simply for linking people on a day-to-day basis. By analyzing the interactions between people connected to the CoSy system, it quickly became clear that there are three types of people. On the one hand, there are those who can always be reached via CoSy and those who only use it sporadically. On the other hand, some people never touched the system.

Although some people refused to participate, a major benefit of the system was to facilitate the task planning and preparation. People mostly agreed on the fact that CoSy helped to reduce the number of necessary meetings (which also became shorter) and improve communication. Hence, CMC was considered to provide a more convenient form of communication.

The following statement may illustrate the previous argument:

« People who need decisions taken within tight deadlines, and have been thwarted by non-cooperative colleagues, are finding that they can carve new, de facto, permission pathways around the difficulty by using CoSy. »⁸¹

⁷⁷ A Forum usually implies interaction through the posting of new messages or comments on previous messages (i.e. follow-ups)

⁷⁸ Computer-Mediated Communication

⁷⁹ Keynes Milton, « The Open University », *op.cit.*

⁸⁰ *ibid.*

The psychological advantages of similar communication systems are very important, considering the fact that people have more time to say what they really mean and do not have to express themselves under enormous pressure which sometimes occurs in traditional face-to-face meetings.

Finally, a statistical analysis showed that the CoSy system was mainly used for conferencing purposes (65% of the connection time was spent on conferencing) which gives an indication of the success over traditional facilities like an e-mailing system.

Inside an academic environment, a need for collaboration is usually the main incentive for using CMC. An example is the On-line Educational Research Workshop⁸² (The Ontario Institute for Studies in Education), where it was important to create a link between leading scholars in the field of educational computer communication in order to share or develop research skills and needs.

The conference that was organized, according to this goal, lasted three months. A tight relation existed between the moderator's input and the level of activity inside the conference. People in general felt that through this conference, collaboration became a valuable, stimulating and rewarding process for expressing new ideas. However, there was a problem of adapting to the on-line interaction. The conference required small regular inputs, which sometimes can be difficult for a participant.

Other studies indicate that a conferencing system does not always end up in a big success despite the fact that participants enjoyed easy access to hardware and software components. This leads to the conclusion that a CMC system with a huge potential heavily relies on the motivational factor. Failure therefore is inevitable if people are not enough motivated to participate. This argument is underlined by a case study of the 'Scientific Research via EIES'⁸³ where a high drop-out rate of scientific participants occurred, due to a low-priority participation factor.

⁸¹ Keynes Milton, « The Open University », *op.cit.*

⁸² *ibid.*

⁸³ Electronic Information Interchange System, *ibid.*

A possible remedy for this motivation-problem is indicated by the authors. Encouraging participants through the presence of a « human facilitator » should be a first initiative. Furthermore, there is also a need for moderators who establish an active leadership and help directing the discussions inside a given CMC-conference.

Further studies indicated that collaboration meant overcoming some common barriers like a potential difficulty to gain on-line access. Time constraints and costs of telecommunications are additional problems that have to be solved.

A general conclusion for an academic environment was based on the need for CMC systems to be selected according to these factors:

- ease of use
- existence of facilities for off-line editing
- functionality of linking comments inside a conference
- sub-division of conference topics
- ability to inter-connect with other conferencing systems.

When using CMC for teaching, the domain of application for conferencing systems changes and new problems arise. Case studies developed in this last field concern for example the New Jersey Institute of Technology⁸⁴.

A change in the teaching strategy was analyzed where the virtual classroom was implemented. This implied the use of peer learning groups where students assisted each other in various educational tasks. Conclusions from this shift in strategy was that learning outputs were at least as effective as outcomes from traditional face-to-face courses. Once again, it became obvious that motivation plays a major role in the success of an on-line course.

A study from the University of Bath⁸⁵ (U.K.) in addition stressed the fact that by using the CoSy system, it also appeared that computer-conferencing changes the structure of the discussions. To illustrate this argument, consider the following statement:

⁸⁴ Keynes Milton, « The Open University », *op.cit.*

⁸⁵ *ibid.*

« The unique characteristics of computer-conferencing require a shift in the perception of the role of discussion in seminars away from linear discussion paths to that of many branching paths which have to be considered and dealt with simultaneously. »⁸⁶

Finally, using the CoSy system inside multimedia Distance Education was done by the Open University (U.K.). This meant, dealing with a great number of students accessing the conferencing system.

A survey showed that approximately one third of all the students posted one or several messages. Another third only participated by reading those messages, whereas the remaining third used the CoSy system less than 5 times. The Open University concluded that the use of conferencing requires « careful and extensive structuring of the on-line environment » to facilitate the task of both students and teachers to make positive contributions to the on-line course.

To conclude, it is necessary to draft out the major lessons learned from these case studies. The reader may have realized that motivation is a common problem for conferencing systems. This problem is linked to the need of effective moderation inside a computer-mediated conference. Giving the users a maximum of support and facilitating their access to the conference can always be found in a successful computer-conferencing system.

6.3 CASE STUDY 2 : THE DESIGN AND USE OF INTERNET-MEDIATED COMMUNICATION APPLICATIONS IN EDUCATION: AN ETHNOGRAPHIC STUDY BY STUART C. LAUGHTON⁸⁷

We think that this case study can be of a particular interest because it involves many elements that are related to our own study in Distance Learning. Similarly to our asynchronous computer-conference, S. Laughton designed an application which he called ASD (Asynchronous Structured Discourse) in order to evaluate the interactions between all the different people engaged in a learning process.

⁸⁶ Keynes Milton, « The Open University », *op.cit.*

⁸⁷ « Ethnography is the art and science of describing a group or culture. The description may be of a small tribal group in some exotic land or a classroom in middle-class suburbia. »
Laughton Stuart Charles, *The design and use of Internet-Mediated Communication Applications in Education: An Ethnographic study*, *op.cit.*

The idea was that the use of computer-mediated communication tools inside an educational environment requires real collaboration between technology specialists and domain practitioners. Therefore, designers of computer-mediated communication applications should think of computers as a « medium for human-human communication ». Stuart Laughton worked out four different case studies in which he analyzed the structure of conversations between people to get a better understanding of collaboration processes.

These case studies included 'On-line Debates' of ethical issues in computing at college level, 'Issues On-line' at high-school level, an on-line 'Multimedia Magazine', as well as 'On-line Discussions' of an undergraduate college computer science programming course. The 'On-line Debates' and 'On-line Discussions' are of particular interest for our purposes. Hence, we will have a closer look at those studies and retrace Laughton's main conclusions.

6.3.1 THE ON-LINE DEBATES

Designing this course implied the adaptation and use of the 'Daedalus Integrated Writing Environment', which is a network application that we already presented in our first part. Another application in use was the 'World-Wide Web Interactive Talk'. This tool incorporates CGI⁸⁸ and HTML⁸⁹ forms as « a formal and persistent conferencing forum. » The concept of formality implies a certain conversational structure, whereas persistency means that the messages will not disappear and become part of a database.

In general, students participated in this course because it was foremost a requirement for a credit course. Grading the participation is always a strong incentive for getting students to participate. Only a few students thought that this course could add something constructive to their learning process. Some students also felt responsible for contributing to the discussion based on the content of this discussion and thought it was important to get an opportunity to think about 'ethical issues' in computing. Although the 'On-line Debates' helped shy people to participate, it is important that some students thought of computer-mediated communication as

⁸⁸ Common Gateway Interface

⁸⁹ Hypertext Markup Language

an « artificially controlled environment » lacking the challenge of interaction in face-to-face meetings.

6.3.2 THE 'ON-LINE DISCUSSIONS'

This course was set up by S. Laughton not to illustrate collaboration in design but to present an « application of WWW-based asynchronous structured discourse » for students, making use of computer-mediated communication. This application particularly intended to stress actual classroom dynamics and pedagogical goals and constraints involved when using network mechanisms⁹⁰ for educational purposes.

WWW-pages were used to deliver course materials, whereas e-mail functioned as a transmitter for on-line announcements from the teacher to his students. In addition, it was through the electronic mailing system that the students communicated with the teacher whenever they had questions about the on-line course. The discussion took place under the form of reading and posting of messages, using Laughton's ASD application.

An analysis of all the conversations showed that network mechanisms support effectively pedagogical goals like enhancing the contact between teacher and students, although reducing the teacher's « heavy presence » at the same time. When reading some examples of conversations between the teacher (S. Laughton himself in this case) and his students, it is quite revealing but also surprising to realize that the students ask different types of questions (that are more frank, more open) when they are not in a face-to-face meeting with their teacher.

Students conceived all three network mechanisms as very useful for the on-line course and particularly appreciated the WWW-pages. Throughout the use of the asynchronous discourse, they were able to ask fellow students to help or give advice whenever there was a problem. The teacher sometimes had to intervene but could also post messages that gave hints towards the solution of a certain problem. In this way, students were directed towards solutions and

⁹⁰ e.g. WWW-pages, e-mail, structured asynchronous discourse

were able to solve problems by themselves (which the author calls « learning through the social construction of knowledge »).

In his paper, S. Laughton gives a couple of statistics that seem to indicate that students felt comfortable with the network as a means of communication. Even those students who preferred face-to-face meetings did acknowledge that network mechanisms represent a useful complement to the traditional form of communication.

Having had a quick look at both systems, we may now give the main conclusions that resulted from the analysis of Stuart Laughton's case studies.

From a general point of view, the implementation of an on-line course always requires a good understanding and description of both the design process and the use of any application. Designing a course therefore needs an integration of all the pedagogical activities of the educator with those of a technologist who cares about the problems related to computer systems. This integration represents a basis for any collaborative design.

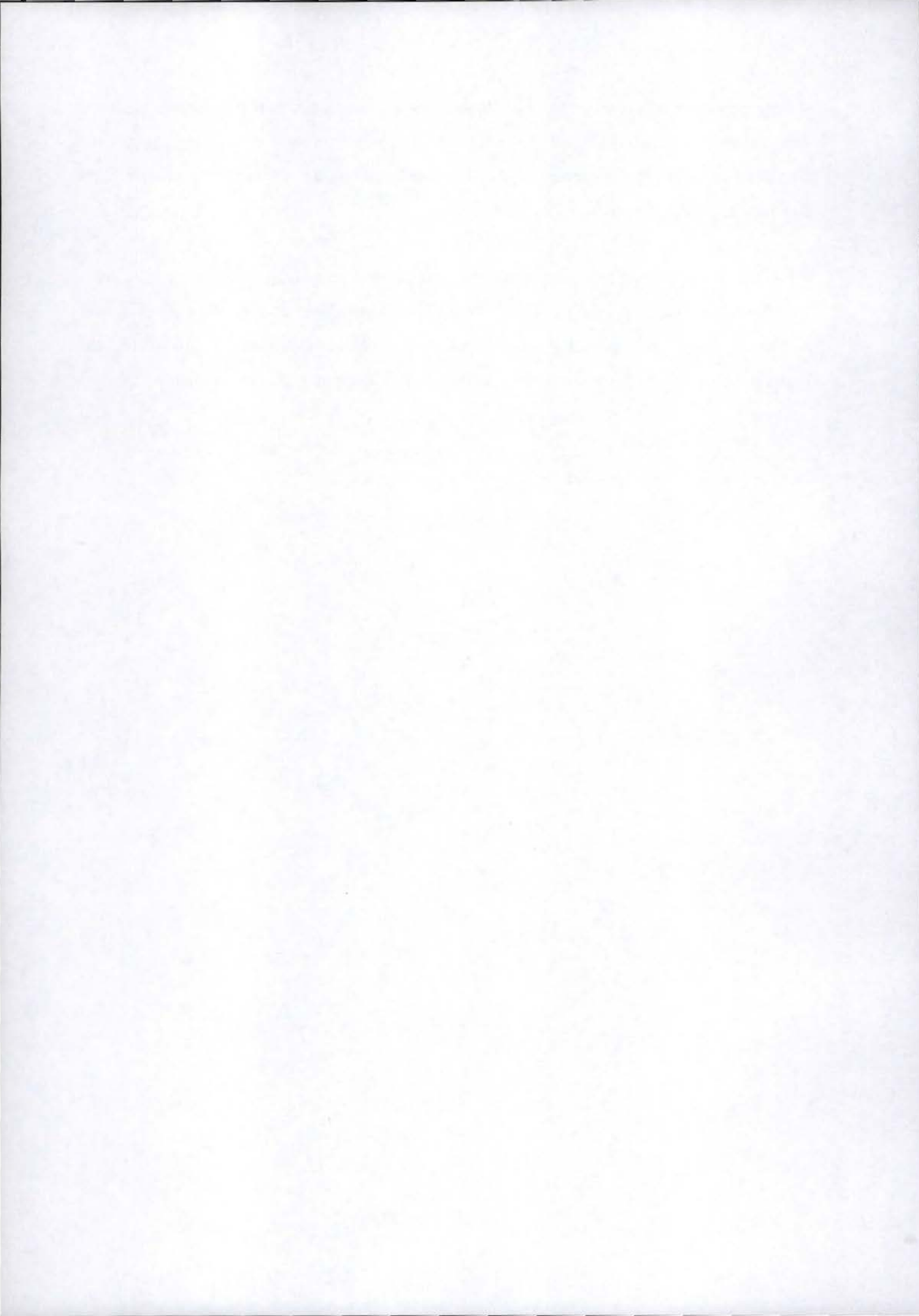
The importance of keeping the focus on the activity that has to be modeled implies designing the conversations by using scenarios. These scenarios have to be constantly re-evaluated in order to stimulate new design ideas for both application and activity.

Concerning the aspect of the applications in use for the course, it is necessary to choose better integrated tools to facilitate the educator's task. But the use of network technology also intends to shift from a teacher-centered structure towards a structure where the student becomes the central element. This argument is most important if one wants to free the student from an excessive authoritative presence of a teacher.

In this context, the ASD application which S. Laughton designed did effectively transfer the control and authority to the student. Nonetheless, the author states that it is not enough just to apply this mechanism but that there must be some sort of traditional « off-line » instruction, meant to regulate the degree of control and authority transfer.

A very important conclusion by S. Laughton is the acknowledgment that computer-mediated communication (CMC) should be used as a complementary educational technique. Complementing rather than replacing the traditional classroom does in fact mirror the main conclusion. Finally, Laughton states the following:

« I conclude that a combination of CMC mechanisms, more and less structured, will be most appropriate for many applications. For example, a synchronous Internet-based mechanism similar to Daedalus could support brainstorming and side conversation, preserving the asynchronous structured mechanism for formal proposals, arguments, and results. »



7. EVALUATION RESULTS

The Computer Conference Simulation (see Appendix D) effectively lasted three weeks. It began on 7th of April 1997, to end on 25th of April 1997. The first week was held during the Eastern break and therefore can be considered as a transitional week, allowing the students to become familiar with the system and giving them an opportunity to read through all the background information put on-line.

Therefore, it is quite normal that participation during the first week was particularly low. Only one student posted a message, with one of the mediators giving an immediate reply to guarantee the motivation of our participants.

The implementation of our Computer Conference encountered some major problems. Mainly, the localization of the resources needed by the learners for doing some reading was not very efficient. Our conference included electronic pages that contained external links. This apparently was not a very bright idea because participants suggested to us that they wanted to have internal links with direct access to the electronic resource documents. The need to browse the Internet for other documents, according to the learners during their experience, was necessary only when a specific idea or solution was put forward in the group discussion.

Because of the external links, the learners were first required to browse the Internet, having no exact idea of what to look at. This « surfing » of the Internet took a lot of time and hereby frequently demotivated the learners.

We created the browser-page containing external links, instead of doing an information research with a well-known browser like 'Yahoo' or 'Lycos'. However, this research would have resulted in thousands of possible links, which in turn creates more demotivation than making use of our browser-page with predefined external links⁹¹.

Another comment that we have to do, concerns the application used in our conference. Learners frequently complained about the lack of a message-management system. The problem for the learners was that the on-line conference did not stress which messages were already read and which were new to the conference. We did not think about having some automatic removal mechanism, also creating a list of the already read comments. Hence, this lead to some confusion in finding the most recent messages and discussions.

Participants sometimes didn't follow the discussion anymore because another participant was against their ideas. However, discussion inside the conference was mainly at a satisfying level, with no overload of unnecessary comments. Discussion strictly remained on the subject matter, which of course was required by the mediators.

Both mediators made their contribution to the conference and achieved a good implementation level of the Computer Conference by guaranteeing the motivation of all the participants.

We thought that this motivation could be linked to some privacy issues usually raised by participants. However, anonymity did not seem to be an important factor. To the contrary, people inside the conference thought that the actual fact of knowing each other's identity was more encouraging than if everyone stayed anonymous.

According to us, it is important in the field of « ethics » or « ethics of computing » to know what everybody thinks, without trying to hide one's real name.

⁹¹ Our page contains more or less twenty HTML-links (see Appendix B)

7.1 QUANTITATIVE EVALUATION

An evaluation based on quantitative consideration is not enough. Still, this statistical approach can be found in every analysis and we will therefore do our own. What follows is a three-dimensional graph (see figure 7.1) that displays the number of messages posted during each week the conference was set up. We know that the low level of participants make the statistics not very convincing!

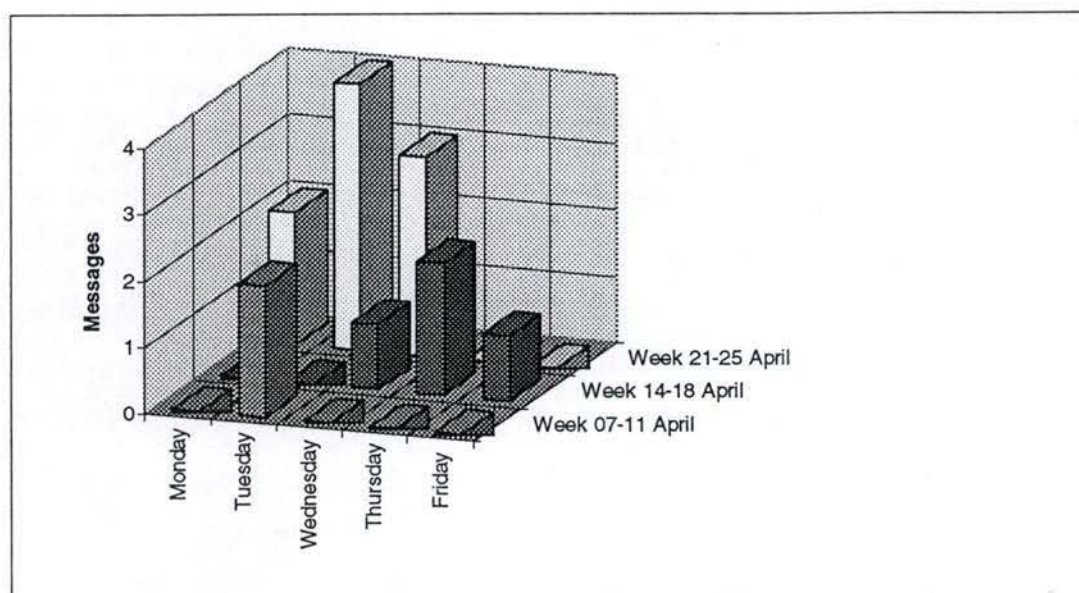


figure 7.1 Statistics of posted messages during the CC

It quickly appears that most of the discussion occurred right at the end of the conference. This suggests that people need a minimum amount of communication to feel involved and be responsive. There were a total of 15 appropriate messages that remained in the conference during those three weeks. Right at the end, participants were supposed to submit an evaluation questionnaire that contained eight questions relevant to their person and to the conference⁹². These questions were as follows:

1. Are you a frequent Internet user?
2. Did you like to communicate with other people?

⁹² The evaluation questionnaires submitted by the participants can be found in the Appendix E

3. Did you encounter any major problem using the Conferencing System
(Please detail your answer)?
4. What did you like / dislike in the experience of reading and answering (or posting) messages?
5. Was privacy a major issue for deciding whether to participate or not?
6. What do you think about the use of computers for educational purposes?
7. Would you like having on-line courses at your university?
If 'Yes', should these on-line courses substitute or complement the traditional courses?
8. Any further comments about the computer conference?

The first question '*Are you a frequent Internet user ?*' was mainly supposed to help us in building an appropriate profile for every participant. We think that our conference design needs to pay particular attention to those people that do not use Internet on a frequent basis.

The question '*Did you like to communicate with other people?*' tries to evaluate if we achieved our main goal, which of course is to make people communicate with each other. Problems in the use of the conferencing application were supposed to be targeted with the third question. We needed to get some feedback from the participants and therefore hoped that they would give us good advice about how to improve our system. The need for considering the learner's perspective was already given in a previous section of our thesis.

The question '*What did you like / dislike in the experience of reading and answering(or posting) messages?*' is meant to explore if the discussions were well organized and if the structure of the message system was appropriate or too rigid. The privacy issue needed to be included with question number five, because this traditionally promotes or hinders the participation rate.

The question '*What do you think about the use of computers for educational purposes?*' aims at evaluating the use of computers in our society. We want to know if computers are well integrated our common life and if they are considered as just an additional tool for many purposes or a necessity that also needs to be applied to every educational system.

By asking question number seven, we wanted to see if our participants could imagine having courses that make use of Computer-Mediated Communication. The additional 'substitution' or 'complementation' feature is meant to verify our main conclusion.

The last question about '*Any further comments about the computer conference?*' gives the participants the opportunity to formulate any additional ideas concerning issues that may not be covered by our previous questions.

Also, it is important to recognize that these questions sometimes stay on a very general level, to allow participants to answer in a more imaginative way, rather than answering with 'Yes' or 'No'. Although every participant agreed to answer our evaluation questions, not everyone did submit the questionnaire. Again, if the participants would have been graded on submitting these answers, this problem would not have occurred. The following table illustrates who contributed a lot to the conference by posting different kinds of messages (either new-content messages or follow-ups).

<u>Name</u>	<u>Number of posted messages</u>	<u>Number of posted follow-ups</u>	<u>Evaluation questionnaire submitted ?</u>
Denise	1	0	Yes
Geoffroy	3+2	2	Yes
Jean-Luc	1+1	1	Yes
Laurent	2	1	Yes
Luc	2	2	No
Nathalie*	1	1	No
Pascal*	3	2	Yes
Bashkim	2	2	/
Jean-Paul	(4)	(2)	/
<i>TOTAL</i>	<i>22</i>	<i>13</i>	

In this table, the number of posted follow-ups is a subset of the number of posted messages. This means that out of the 22 total messages submitted, 13 were posted under the form of immediate replies (follow-ups). The asterisk (*) behind the names of some participants indicates that those people are not actually from Namur. One being from Paris, the other doing his studies at « Liège - ULG. »

As for Geoffroy, the figure (3+2) means that he posted 3 appropriate messages during the conference but however chose to send 2 messages right at the beginning, messages which did not have anything to do with « ethics of computing » and therefore had to be eliminated from the conference.

Opposite to this comment, Jean-Luc effectively posted two messages. However, at some point during the conference, there was a problem with the conferencing system and his second message was not correctly posted. This problem was due to an error by the course administrator who mistakenly used the « `chmod 755 wwwboard.html` » UNIX-command (which only allows reading inside the conference) instead of a « `chmod 777 wwwboard.html` » command (which also allows writing messages).

This problem was quickly fixed the same day but still, it lead to demotivation of this participant, who did not post any further messages consequently. Obviously, a proper conference administration needs to be guaranteed if we want to keep the same level of motivation for all the participants.

Bashkim was the conference mediator, while Jean-Paul took over the function of the conference administrator. Both did not submit any questionnaire because it seemed somehow strange that the authors evaluate themselves.

7.2 INTERACTION ANALYSIS

In this section, we are no going to evaluate the participants contributions, based on the analytical framework developed by France Henri⁹³. Before doing this analysis, we will first give

⁹³ Kaye Anthony R., *Collaborative Learning Through Computer Conferencing - The Najaden Papers*, op.cit.

a short description of each participant's contribution, a description that mainly is founded on the messages posted by each member of the conference.

7.2.1 PARTICIPANT'S PROFILES DURING THE CONFERENCE

Denise

She was the first to effectively begin the conference by posting an initial statement. The content of that message showed that she did some research on the topic before posting it. The fact that she tried to incite others to participate and communicate their point of view can be seen as a positive aspect. Unfortunately, she did not post any messages afterwards which seems to indicate that she might have thought her duty was fulfilled. This of course lead to the conclusion that she was not too motivated for continuing discussions, whatever reasons she might have had. Maybe this was due to the fact that it took some time before the conference saw some more participants.

Geoffroy

The most active participant actually is a good characterization for him. His actions were to review other's positions and not only putting forward some out-of-context ideas. Furthermore, he mainly gave some recommendations by clearly stating his position towards a certain idea. As a matter of fact, it seems as he wanted to defy others to react to his statements. Emotions seem also to be very important for him because at the beginning of the conference he posted some messages which desperately called for help, being preoccupied by the difficulty to start discussions.

A positive aspect was that he tried to incite others to participate by broadcasting an e-mail message.

Jean-Luc

A good-humored writing style characterizes his participation. This might sometimes result in the conference to become less formal, which is not necessarily a negative aspect. He gave his own point of view without criticizing others or inciting them to post a follow-up.

Laurent

It is particularly interesting to see that he only started posting messages when the conference was set going. In particular, he mainly posted messages relating to a new topic inside the field of ethics. Hence, he did not concentrate on follow-ups but brought in some new ideas. His only follow-up did not review some other person's position but stated his attitude towards a topic. His reply was therefore more or less neutral and not really an adequate follow-up.

Luc

His reactions to the conference were more or less to give his proper ideas. However, he also tried to incite others to think about different aspects by asking some additional questions. This does effectively differentiate him from other participants.

Nathalie

Not being a student from the FUNDP computer science department, she replied to the conference by sharing her point of view on the subject matter and also stressing some interesting ideas. It is particularly important to come up with new ideas in order to stimulate others to react. A large number of new ideas therefore gave more opportunities for other participants to post an appropriate follow-up.

Pascal

His strategy inside the conference was mainly determined by his desire to directly reply to some other's message and he also clearly showed when he did not share somebody's point of view. Reasoning based on concrete ideas and examples, situated inside the field of computer science, does characterize his participation.

His replies were sometimes quite extensive but nevertheless well structured. One can see that he took his participation very seriously.

Bashkim

Officially, he took over the mediator role which consisted in posting messages for stimulating other participants to react and guarantee the on-going of the discussion. This of course is a very important factor from the motivational point of view.

Jean-Paul

On the opposite, his first role was to start the conference and to welcome all the participants. His function was also to be the conference administrator and therefore deleting inappropriate messages from the conference, which was necessary in the beginning. He also guaranteed to give some feedback by posting information related to the conference background.

7.2.2 ANALYTICAL FRAMEWORK

The analytical framework defined by France Henri does in fact distinguish five different components that structure a set of conversations between members of a discussion group. These five components are: participative, social, interactive, cognitive and metacognitive.

We already analyzed the participative aspect, e.g. number of messages posted. The social aspect of this framework does underline those messages that come as « *a statement or part of statement not related to formal content of subject matter* ».

Social aspects did not play a lot during our conference. Whenever participants posted messages, they tried to focus on their primary task to look for information and share it with the other group members. Geoffroy did in fact contribute some social aspects to the conference by stressing his feelings about a certain topic and also calling for other people to participate in the forum. Besides, Laurent also contributed some socializing aspects, e.g. « *I see that there is a pleasant atmosphere inside the forum* »

The third component, which is the interactive element, tries to consider chains of connected messages. Unfortunately, because this was only a simulation and messages did not come in great numbers, messages were mostly posted as follow-ups and formed clusters. However, these message chains did not always share a common origin and the reply title was sometimes misleading, cfr. a reply on a topic which was not a reply at all.

The cognitive component, i.e. « *a statement exhibiting knowledge and skills related to the learning process* », was frequently used throughout the conference. Luc, for example gave some interesting comments and ended his message by actually putting forward some questions

that were meant to incite others to think about them and post replies. Most of the participants however contributed some cognitive aspects by formulating hypotheses. Not many inferences based on previous messages were made, but everyone tried very hard to come up with questions that should motivate the others to communicate their own point of view.

Finally, the analytical framework defines a metacognitive component. France Henri defines it as « *a statement related to general knowledge and skills and showing awareness, self-control, and self-regulation of learning* ». This component can be found at some point when Geoffroy explains his position towards the definition of the field of ethics, and we realized that he uses a form of language that seems to indicate that he defies every participant to proof that he was wrong. Although this seems to be a very aggressive attitude, we have to acknowledge that it contributed some value to the conference.

To conclude, we admit that applying the analytical framework could also mean doing some statistics on the frequency of use of these different components. Since this conference was only a simulation, this would not have made much sense.

However, it is particularly important to see that all five components can be found inside our simulated forum. This indicates that the degree of participation was not too bad for such a small group. Also, it underlines the need to have all sorts of different participant's profiles to turn a conference into an interesting learning space.

France Henri actually concludes in his work that « *CMC messages are polysemic⁹⁴, and that content analysis helps us to understand the learning process and offers data useful to improving the efficacy of interaction with students.* »

7.3 EVALUATION CONCLUSIONS (GUIDELINES)

First, we will try to relate the different results from the CASE studies, seen in the previous sections 6.1 and 6.2, to our own results.

The CoSy system established a tight relation between the moderator's input and the level of activity inside the conference. We can only confirm this conclusion because at some point our

⁹⁴ The author seemingly uses this expression to indicate that messages have numerous semantical content

conference did not progress at all until the mediator made some input. The problem is to get the students to do small regular inputs. The CoSy system links this problem to the importance of motivational factors. We think that this is one of the most important conclusion.

Concerning the structure of the discussion, CoSy conclusion indicates that there is a shift from linear discussion towards diverging ones when using CMC communication. This is somehow true, but we don't think that this must be an advantage because it sometimes leads to chaotic discussions.

Concerning S. Laughton's study, participation was somehow guaranteed by the fact of grading people on their contribution to the discussion. Clearly, our conference could not make use of this type of motivation.

One of S. Laughton's conclusions after using his 'On-Line Debates' system was that students seemed to be more frank, more open than with face-to-face meetings. We cannot confirm this observation but maybe this is due to our simulation or the fact that the mediators were students too. Hence, a different kind of relationship was established.

More important, Laughton concluded on a need for traditional « off-line » instruction to accompany an on-line course. This conclusion perfectly fits into our questionnaire evaluation, where students indicated that they only wanted « on-line » education as a supporting educational technique.

After these comparisons, we may now give some general guidelines that result from our experience with the asynchronous computer-conference:

- *the need to simplify the learning process*

There is no use for employing complicated conferencing applications that look « fancy » but do not really enhance the student's learning process.

- *considering the user's view of the conferencing system*

Because so many students made « constructive » comments about improving the conferencing interface, we think that this valuable feedback should not be ignored. Also, the system in use should be tolerant to errors to prevent the learner to loose all motivation.

- *the need to do regular evaluations of the conferencing system*

This guideline is a direct consequence of the previous one. There is always space for improvement which is only achievable through constant evaluation.

- *providing motivation for the student*

The mediator must offer all his help and knowledge and provide guidance during the discussion. Again, this is one of the fundamental guidelines.

- *making the on-line course a complementary technique*

The challenge of face-to-face meetings cannot be simulated and distance learning applications should only complement the traditional educational approaches. This last guideline can be seen as a sort of general conclusion.

8. CONCLUSION

The first part of our study consisted in giving a general overview of the Distance Learning concept, different technologies and applications that allow an effective realization of Distance Learning. The construction of the second part mainly was based on the simulation of a Computer Conference developed throughout three phases: design, implementation, evaluation.

The design phase showed that it was necessary to make a distinction between 'Pedagogical Design' and 'Operational Design' to realize that our quality criteria cannot always be satisfied. Therefore, a compromise had to be found between both design approaches. It is important to stress that the existing educational system strongly influences the design of every Computer-Mediated Communication course. The characteristics of this educational system cover aspects like the availability and access to computers, the way in which teaching is done (e.g. face-to-face meetings might be preferred) or simply the constraints that existing time schedules might impose on learners.

The implementation phase made us aware of the need to choose the right software with an adequate human-computer interface. Also, when implementing an on-line course, it is vital to facilitate the information research of the student to keep his motivation at an appropriate level.

The evaluation phase lead us to conclude that the user's needs have to be considered to guarantee their participation. In addition, we realized that CMC was a good technology to enhance a distance learning process. However, our results indicate that it should only be used for complementing the existing teaching methods.

Having in mind these conclusions, is distance learning an appropriate technique for the FUNDP?

Before answering this question, we have to put forward some ideas from François IMBERT⁹⁵ which concern the introduction of new features into a pedagogical system.

The strategy we chose to design our on-line course is identified by F. IMBERT as a « juxtaposition ». The distance learning approach is actually integrated into the traditional education system. Thereby, we want to bring together the existing learning characteristics and the « innovative » distance learning features. However, we do not want to transform the actual learning system as a whole. CMC technology is only meant to be complementary.

In deciding whether distance learning should be adopted at the FUNDP, it is important to also integrate the institutional perspective, i.e. what is the aim for introducing this new approach ?

We could argue that because most universities already provide some sort of distance learning, so should the FUNDP. Clearly, this is not a sufficient reason. We think that changes like these mean opening up to new ideas, new approaches. A university is meant to do research, to innovate. In this context, one cannot judge a new approach like distance learning, unless it has been experienced at least once.

Following the ideas of F. IMBERT, it would therefore be appropriate for the FUNDP to adopt a strategy that tries to make use of existing Distance Learning studies in order to analyze our current educational system and be able to enhance it.

⁹⁵ Imbert François, « Pour une Praxis pédagogique », Matrice, 1985.

Students want to have some sort of complementary learning technique that introduces flexibility in their learning process. Furthermore, a possible result of our study is given by the opportunity to find some common ground with the Virginia Polytechnic Institute and State University.

As a matter of fact, our idea to share an asynchronous on-line conference in the field of 'Ethics of Computing' was positively welcomed by Dr. J.A.N. Lee (Computer Science Department - Virginia Tech). We think that it could be very interesting for the FUNDP to participate in such a project, where students from Namur could discuss their points of view with students from a different cultural background.

Finally, we think that distance learning should be adopted by the university of Namur as a complementary learning technique. Our institute could tighten their relations with other universities, while the students would get some increased flexibility in their courses.

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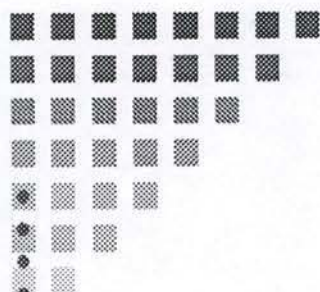
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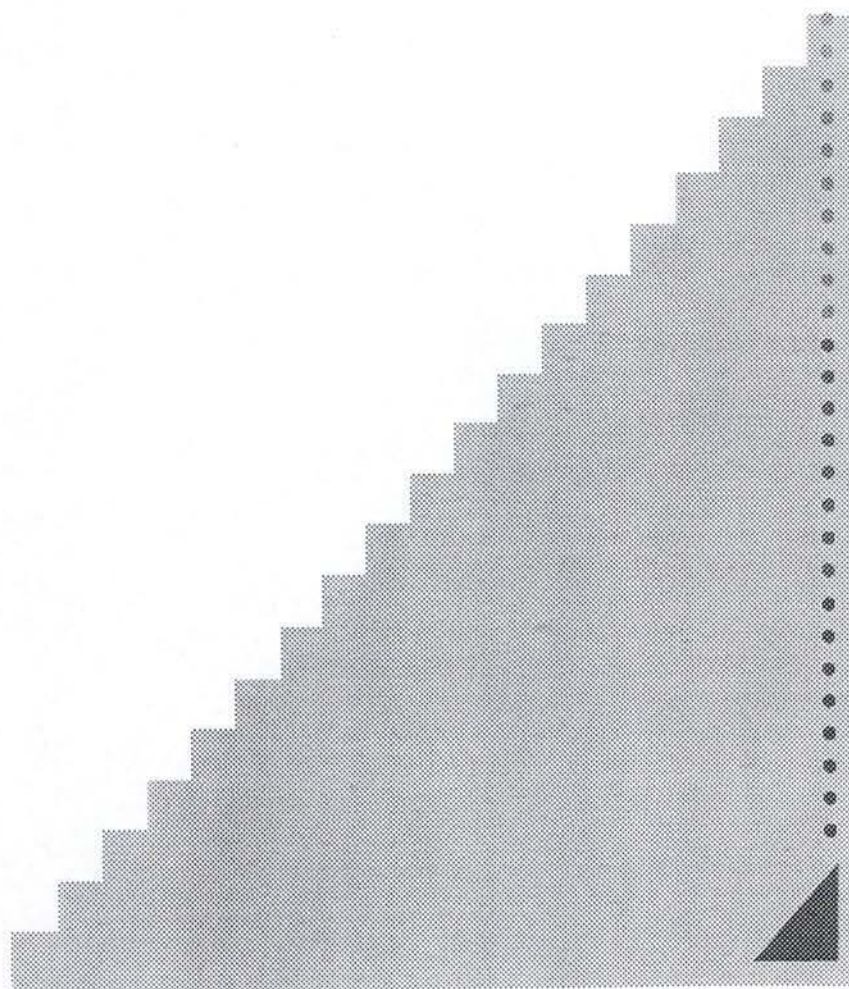
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APPENDIX



APPENDIX A

Ethics of computing - Some relevant links

Professionalism in Computing - <http://ei.cs.vt.edu/~cs3604/support/>

Language: English

Structure: list of links with appropriate explanations

Connectivity: medium

Hierarchical presentation of the links: partial, ordered by courses

Observations: text containing links to courses from other universities

Social Informatics Homepage - <http://www.ics.uci.edu/~kling/si/sitr1.html>

Language: English

Structure: list of links with appropriate explanations

Connectivity: high

Hierarchical presentation of the links: partial, ordered by universities and the courses related to the topic

Observations: Content about social informatics, obvious relevance towards ethics without specifying this inside the homepage

Computer Social Issues of Computing - <http://www.engr.csulb.edu/~jewett/social/>

Language: English

Structure: categorized links

Connectivity: high

Hierarchical presentation of the links: partial, indexation inside a category

Observations: none

Ethics and the Internet: Definitions - <http://www.duke.edu/~wgrobin/ethics/define.html>

Language: English

Structure: a set of unstructured links are given first, then simple plain text follows

Connectivity: medium

Hierarchical presentation of the links: no order

Observations: This page gives definitions of terms like 'ethic' or 'Internet', no particular reference to other domains in ethics

Ethics Updates Main Page - <http://www.acusd.edu/ethics/>

Language: English

Structure: heavily structured page with a table containing some main fields in ethics

Connectivity: high

Hierarchical presentation of the links: strict order, distinction between 'Theory' and 'Application'

Observations: Homepage especially designed for instructors and students in ethics
Resources given in addition at the end of the homepage

Ethics on the Net - <http://ctg.byuh.edu/ctg/staff/JinYip/bm389-ethic.html>

Language: English

Structure: directory given first, then follows a list of links organized by general topics concerning 'Ethics'

Connectivity: high

Hierarchical presentation of the links: partial (not inside a domain of a certain topic)

Observations: A lot can be found about 'Ethics' but nothing can be stated about the quality of the given links (relevance to 'Ethics' not always guaranteed)

Censorship and the Internet - Controlling acces to the Internet

CCSR, Leicester: Home Page - <http://www.cms.dmu.ac.uk/CCSR/>

Language: English

Structure: set of categorized links

Connectivity: medium

Hierarchical presentation of the links: Partial inside 'ethics of computing' (categories like conferences,papers,..etc.)

Observations: Content about Ethics in the Computing Curriculum

Why Codes of Ethics - <http://www.cpsc.ucalgary.ca/~bhanji/overall.html>

Language: English

Structure: structured text with links towards topics discussed inside the text

Connectivity: low

Hierarchical presentation of the links: no order, there are no links towards other homepages

Observations: Text covers some aspects of 'ethics of computing' and 'codes of ethics'

Boston University's Conditions of Use and Policy on Computing Ethics -

<http://www.bu.edu/FORMS/Ethics.html>

Language: English

Structure: simple plain text

Connectivity: low

Hierarchical presentation of the links: no order, no further links

Observations: Content strictly about 'Computing Ethics'

Computing Ethics and Guidelines (Univ. of Pittsburgh) -

<http://www.pitt.edu/~document/ethics/ethics.html>

Language: English

Structure: simple plain text

Connectivity: low

Hierarchical presentation of the links: no order, no links towards other documents

Observations: Precise content about 'Computing Ethics' and Guidelines

Protection and The Internet - <http://caviar.mic.ucla.edu/internet-protection.html>

Language: English

Structure: simple plain text, only one link to the owner's homepage

Connectivity: low

Hierarchical presentation of the links: no order

Observations: none

Censorship at Carnegie Mellon -

<http://www.cs.cmu.edu/afs/cs/user/kcf/www/censor/index.html>

Language: English

Structure: set of categorized links plus text containing related links

Connectivity: medium

Hierarchical presentation of the links: partial, but not related to ethics in general

Observations: contains terms like 'Code of Ethics' or 'Censorship' related to ethics

CNN Technology: Online ethics -

http://www.cnn.com/TECH/9509/computer_ethics/index.html

Language: English

Structure: simple plain text plus links to related sites dealing with ethics

Connectivity: medium

Hierarchical presentation of the links: no order

Observations: none

Just Think Foundation/Violence Media - <http://pomo.nbn.com/home/justthink/>

Language: English

Structure: text plus links to related topics

Connectivity: low

Hierarchical presentation of the links: no order

Observations: Possibility of connection towards ethical issues but not explicitly specified

Michigan Telecom/Techn/Law - <http://www.umich.edu/~mttlr/>

Language: English

Structure: categorization into different topics

Connectivity: low

Hierarchical presentation of the links: no order

Observations: Includes links towards Information access and politics/law/power ...etc.
implies possible relation to 'ethics' but not explicitly specified

MIT Ethics Center for Engineering & Science - <http://web.mit.edu/ethics/www/home.html>

Language: English

Structure: set of links

Connectivity: high

Hierarchical presentation of the links: no order

Observations: Content = Ethics for engineering & science, covering only some aspects of ethics

National Political Index (Newsgroups) - <http://www.politicalindex.com/>

Language: English

Structure: Set of links plus categorization inside those links

Connectivity: medium

Hierarchical presentation of the links: partial, links presented by countries and topics

Observations: possibility of finding related topics to ethics which is not explicitly stated

Newsgroups Relating To Ethics In Cyberspace -

http://www.cs.uidaho.edu/lal/cyberspace/cyberspace_newsgroups.html

Language: English

Structure: list of newsgroups relating to ethics

Connectivity: high

Hierarchical presentation of the links: partial (alphabetical)

Observations: private collection does not guarantee exhaustiveness

Notre-Dame Indiana/Barger - *<http://www.nd.edu/~rbarger/cases.html>*

Language: English

Structure: list of links pointing towards cases about 'Ethics of computing'

Connectivity: low

Hierarchical presentation of the links: partial (alphabetical)

Observations: Content limited to one single aspect in ethics covering fields like privacy, cheating, security...etc.

Santa Clara: Markkula Center for Applied Ethics - *<http://www.scu.edu/Ethics/>*

Language: English

Structure: set of links plus short explanation

Connectivity: medium

Hierarchical presentation of the links: no order

Observations: Homepage covers a few recent topics and gives a link towards 200 ethical links. Good idea of giving a short explanation for each link

The Net: User Guidelines and Netiquette, by Arlene Rinaldi -

<http://www.fau.edu/rinaldi/net/index.htm>

Language: English

Structure: simple plain text

Connectivity: low

Hierarchical presentation of the links: no order

Observations: Content about the ten commandments for computer ethics

APPENDIX B

Computer Conferencing Application Code

Index file « CC.html »

```
<html>
<frameset rows="10%,90%" frameborder="no" border="0">

    <frame src="menuCC.html" scrolling="no" marginheight="0"
marginwidth="0" frameborder="0">

    <frame src="conf.htm" marginheight="0" marginwidth="0"
frameborder="0">

</frameset>
<body>

</body>
</html>
```

Main File « conf.html »

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
<!-- *****
      EDITEUR WEBEXPERT
      DATE DE CREATION: 26/03/97
      DERNIERE MODIFICATION: 26/03/97
***** -->
<HTML>
<HEAD>
<TITLE>Conference</TITLE>
<META NAME="Author" CONTENT="Bashkim Bitiki">
<META NAME="Description" CONTENT="">
</HEAD>
<BODY background="box.jpg">
<MAP NAME="browser">
</MAP>
<A HREF="browser.html"><IMG SRC="WWW.GIF" BORDER=0 WIDTH=1000 HEIGHT=500
USEMAP="#browser"></A>
<MAP NAME="cc">
</MAP>
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USEMAP="#cc"></A>
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</MAP>
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</MAP>
<IMG SRC="WWW.GIF" BORDER=0 WIDTH=1000 HEIGHT=500 USEMAP="#info">
</BODY>
</HTML>
```


File that contains links towards other pages « browser.html »

```
<html>
<body background="http://www.info.fundp.ac.be/~bbitiki/sky.jpg">

<h1> <font color="FF0080"> Voici les résultats de recherche du méta-
browser</font></h1>
<h2> Sujet : <font size=+1> Ethique de l'informatique </font></h2>
<h3> More specific subject</h3>

<dd> <img src=spinball.gif><a href = "http://www-
swiss.ai.mit.edu/6095">Ethics and Law on the Electronic Frontier</a>, MIT
<dd> <img src=spinball.gif><a href =
"http://www.seas.upenn.edu/~mengwong/netsurf">Netsurf: Social Implications
of Information Technologies</a>, University of Pennsylvania
<dd> <img src=spinball.gif><a href =
"http://www.site.gmu.edu/~bcox/LRNG572/00LRNG572.html">Taming The Electric
Frontier</a>, George Mason University
<dd> <img src=spinball.gif><a href =
"http://www.seas.upenn.edu/~mengwong/cis590/clipper.html">Computers,
Ethics, and Society</a>, University of Pennsylvania
<dd> <img src=spinball.gif><a href =
"http://http2.sils.umich.edu/ILS605/DLHome.html">The Making of Digital
Libraries</a>, University of Michigan
<dd> <img src=spinball.gif><a href = "http://actlab.rtf.utexas.edu/">The
Challenge of Interactive Multimedia</a>, University of Texas at Austin
<dd> <img src=spinball.gif><a href =
"http://cs.vt.edu/~janlee/index.html">Professionalism in Computing</a>, at
Virginia Polytechnic Institute and State University
<dd> <img src=spinball.gif><a
href="http://ctg.byuh.edu/ctg/staff/JinYip/bm389-ethic.html">Ethics on the
net </a>
<dd> <img src=spinball.gif><a href="
http://zeta.res.cms.dmu.ac.uk/CCSR/web_lnks/ethwebsit.html">Ethical web
site </a>

</ul>

<center>  </center>
<h3> Need a little surfing </h3>
<dd> <img src=spinball.gif> <a
href="http://www.siu.edu/departments/coba/mgmt/iswnet/issethics/index.html">
Computer Ethics - Cyberethics</a>
<dd> <img src=spinball.gif><a href="http://ethics.acusd.edu"> Ethics
updates</a>
<dd> <img src=spinball.gif><a
href="http://www.ics.uci.edu/~kling/si/sitr1.html"> Social Informatics
Homepage </a>
<dd> <img src=spinball.gif><a
href="http://www.zdnet.com/yahoocomputing/content/reviews/r599.htm"> Yahoo!
Computing -Ethics and the internet </a>

<dd> <img src=spinball.gif><a
href="http://web.mit.edu/ethics/www/home.html">
http://web.mit.edu/ethics/www/home.html</a>
<dd> <img src=spinball.gif><a href="http://www.nd.edu/~rbarger/cases.html">
http://www.nd.edu/~rbarger/cases.html</a>

<center>  </center>

<FORM METHOD=POST ACTION="http://ei.cs.vt.edu/cgi-bin/bbitiki/send2.pl">
```

```

<B>Title : </B><input name="name" SIZE="35" MIN="5" MAX="50"> <BR>
<B>Home Page URL : </B>      <INPUT NAME="e-mail" VALUE="http://" SIZE="45"
MIN="5" MAX="50"> <BR>

<P>
<INPUT TYPE="submit" VALUE="Submit"> <INPUT TYPE="reset" VALUE="Reset"></P>
</FORM>

</TD></TR></TABLE>

<center>  </center>
<a href="http://www.info.fundp.ac.be/~bbitiki/conf.htm"><img src=h.gif></a>
<p> <i> Copyright Bashkim Bitiki & Jean-Paul Kasel '97 </i> </p>
</body>
</html>

```

File with information about the use of NetMeeting « net.html »

```

<html>
<body background="http://www.info.fundp.ac.be/~bbitiki/sky.jpg">

<h1> <font color="#FF0000"> NetMeeting </font></h1>

<font size=+1> NetMeeting est un logiciel de conférence électronique
synchrone. Avec ce logiciel vous pouvez
partager des programmes et en discuter simultanément. Il suffit de
l'installer s'il n'est pas déjà installé
sur le disque local. Pour l'installer il faut aller dans <font
color="#FF0800">J:\public\win95\frmm10.exe
</font>
<p>Puis on vous demandera de spécifier le repertoire où on veut installer
le logiciel.

<p>Vous taperez <font color="#FF0800">C:\Program Files\NetMeeting</font>
et le logiciel sera prêt à fonctionner.

<p>Pour des informations plus précises à propos du fonctionnement de
NetMeeting, nous vous contacterons
lors de la première utilisation de ce logiciel.

<p>Nous espérons avoir été clairs et non ambigus. Sinon :

<p>CONTACTEZ <a href="mailto:bbitiki@info.fundp.ac.be"> Bashkim Bitiki</a>
ou
      <a href="mailto:jpkasel@info.fundp.ac.be"> Jean-Paul Kasel</a>

<p> A bientôt.
</font>
<center> </center>

<a href="http://www.info.fundp.ac.be/~bbitiki/conf.htm"></a>
<i> Copyright Bashkim Bitiki & Jean-Paul Kasel '97 </i>
</body>
</html>

```


File with information about Computer Conferencing « cc.html »

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
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<HEAD>
  <TITLE></TITLE>
  <META NAME="GENERATOR" CONTENT="Mozilla/3.0Gold (Win95; I) [Netscape]">
</HEAD>
<BODY BACKGROUND="sky.jpg">

<P><FONT SIZE=+1>Le contenu du cours qui sera développ&eacute; via la
Conf&eacute;rence
El&eacute;ctronique est appel&eacute; <B>&quot;Ethics of
computing&quot;</B>
</FONT></P>

<p><font size=+1> Premièrement vous devez lire les quelques références qui
se trouvent sur la page meta-browser,
pour que vous puissiez vous lancer dans un sujet précis. Le sujet concerne
l'éthique.
Puisque c'est une conférence expérimentale, vous pouvez aborder le sujet
qui vous semble
plus intéressant. Mais ceci doit être obligatoirement lié avec l'éthique.

<p>

<dd> <FONT SIZE=+1><a
href="http://www.info.fundp.ac.be/~bbitiki/netmeeting/calendrier.html">Le
calendrier</a>
<dd><a href="contenu.html"> Le contenu
du cours</a> </font>
<dd><a href="netmeeting/questions.html">
Des questions d'évaluation de cette expérience</a> </font>

<center></center>

<a href=conf.htm> <img src=h.gif></a>

</BODY>
</HTML>
```

File that contains the schedule of Computer Conferencing « calendrier.html »

```
<html>
<body background="sky.jpg">

<h2><li>La conférence va durer 1 à 2 semaines.</h2>

<h2><li>A la fin de la conférence vous devrez rédiger un texte de quelques
pages en utilisant NetMeeting.</h2>

<h2><li> A la fin, vous répondrez au questionnaire d'évaluation, car ceci
est d'importance majeure pour notre mémoire.</h2>

<h2><li>On boira alors un verre ensemble.</h2>

<h2><i> Nous espérons que ce calendrier vous convient; sinon, envoyez nous
vos remarques.</i></h2>
```

Merci,

<center></center>

<p> Retour à la page précédente

<p><i>Copyright Bashkim Bitiki & Jean-Paul Kasel '97 </i>

</body>

</html>

File that contains the evaluation questions « questions.html »

<html>

<body background="sky.jpg">

<p><dd>Utilisez-vous fréquemment le réseau Internet ?
<dd>Are you a frequent Internet user ?

<P><dd>Avez-vous aimé le fait de communiquer avec d'autres personnes ?
<dd>Did you like to communicate with other people ?

<p><dd>Avez-vous rencontré des problèmes bien spécifiques dans l'utilisation de la conférence électronique (Détaillez votre réponse si possible) ?
<dd>Did you encounter any major problems using the Conferencing System (Please detail your answer) ?

<p><dd>Qu'avez vous aimé / ne pas aimé dans le fait de lire des messages, d'envoyer des réponses ou encore de faire des commentaires ?
<dd>What did you like / dislike in the experience of reading and answering(or posting) messages ?

<p><dd>L'anonymat a-t-il joué un facteur important dans votre décision de participer à la conférence ?
<dd>Was privacy a major issue for deciding whether to participate or not ?

<p><dd>Que pensez-vous de l'utilisation des ordinateurs dans le système d'éducation ?
<dd>What do you think about the use of computers for educational purposes?

<p><dd>Aimeriez-vous bénéficier de cours dits 'on-line' dans votre université ?
<dd>Si 'Oui', ces cours devraient-ils se substituer aux cours traditionnels ou être une sorte de complément ?
<dd>Would you like having on-line courses at your university ?
If 'Yes', should these on-line courses substitute or complement the traditional courses ?

<p><dd>Avez-vous d'autres commentaires concernant la conférence électronique ?
<dd>Any further comments about the computer conference ?

<p><center></center>


```
<dd><a href="http://www.info.fundp.ac.be/~bbitiki/cc.html">Retour à la page  
précédente</a>  
<dd><a href="http://www.info.fundp.ac.be/~bbitiki/cc.html">Back to the last  
page</a>  
  
</html>  
</body>
```

File that contains the content of the on-line course « contenu.html »

```
<html>  
<body background="sky.jpg">
```

<h2>(A) HISTORICAL CONTEXT </h2>

In this first part we are mainly interested in the historical context of ethics of computing. But defining the core of the on-line course is very important too. The student should be able to explore the question why ethics might be a problem and also recognize if there is a difference between ethics and social issues of computing in society. Furthermore, the learner is expected to compare a series of textbooks or other relevant documents in order to be able to retrace their content structure (i.e. which issues are being considered all the time and therefore play a major role in the field of ethics).

<h2>(B) INDUCTIVE PART</h2>

Based on the historical considerations, the student now has to make the link towards our society and ask himself which ethical issues are important for everyone nowadays. Reasoning is a major factor and should help to relate ethics to the field of computer science.

<h2>(C) ETHICS COURSES ON THE INTERNET</h2>

Analyzing what is actually happening on the Internet delivers a starting point for confronting the courses offered in ethics of computing. Hence, it would be interesting to take up a couple of links toward courses in ethics and do a comparison. The aim here is to see if issues like history of ethics or case studies are topics that show up all the time inside those on-line courses. The student is also invited to select case studies related to the topical issues.

<h2>(D) TOPICS SELECTIONS</h2>

As it is not possible to study in depth all the topics and issues, make a selection and negotiate it first between yourselves and then with the professor or mediator. The selection must include a general overview of the main theories of ethics, the hottest questions as identified in (A), (B) and (C), and some case studies which really exemplify these questions.

<h2>(E) THEORIES IN ETHICS</h2>

As soon as the selection is made and approved, the study must clearly explicit the problems and show where the ethical decisions are to be made. It also has to show which kind of orientation may be given, according to a specific theoretical approach, and propose different alternatives.

<h2>(F) ADDITIONAL QUESTIONS</h2>

The on-line course should contain a part dedicated to the study of different codes of ethics. The question to be answered here is to see whether these codes meet a solution to the problems and issues as encountered in ethics of computing, and can help in solving the questions raised by the case studies.

<center></center>

BACK

<p> <i>Copyright Bashkim Bitiki & Jean-Paul Kasel '97</i>

</html>

</body>

APPENDIX C

WWW Board Code in CGI-Perl

```
#!/usr/local/bin/perl

# Define Variables

$basedir = "/home/rouge/students/jpk/http-pub/cgi-bin/wwwboard";
$baseurl = "http://www.info.fundp.ac.be/~jpkasel/wwwboard";
$cgi_url = "http://www.info.fundp.ac.be/cgi-
bin/jpkasel/wwwboard.pl";

$mesgdir = "messages";
$datafile = "data.txt";
$mesgfile = "wwwboard.html";
# $faqfile = "faq.html";

$ext = "html";

$title = "On-Line Asynchronous Computer Conference";

#####
#####
# Configure Options

$show_faq = 0;          # 1 - YES; 0 = NO
$allow_html = 1;        # 1 = YES; 0 = NO
$quote_text = 1;        # 1 = YES; 0 = NO
$subject_line = 0;      # 0 = Quote Subject Editable; 1 = Quote
Subject                  # UnEditable; 2 = Don't Quote Subject, Editable.
$use_time = 1;          # 1 = YES; 0 = NO

# Done
#####
#####

# Get the Data Number
&get_number;

# Get Form Information
&parse_form;

# Put items into nice variables
&get_variables;

# Open the new file and write information to it.
&new_file;

# Open the Main WWWBoard File to add link
&main_page;

# Now Add Thread to Individual Pages
if ($num_followups >= 1) {
```



```

    &thread_pages;
}

# Return the user HTML
&return_html;

# Increment Number
&increment_num;

#####
# Get Data Number Subroutine

sub get_number {
    open(NUMBER, "$basedir/$datafile");
    $num = <NUMBER>;
    close(NUMBER);
    if ($num == 99999) {
        $num = "1";
    }
    else {
        $num++;
    }
}

#####
# Parse Form Subroutine

sub parse_form {

    # Get the input
    read(STDIN, $buffer, $ENV{'CONTENT_LENGTH'});

    # Split the name-value pairs
    @pairs = split(/&/, $buffer);

    foreach $pair (@pairs) {
        ($name, $value) = split(/=/, $pair);

        # Un-Webify plus signs and %-encoding
        $value =~ tr/+// ;
        $value =~ s/%([a-fA-F0-9][a-fA-F0-9])/pack("C", hex($1))/eg;
        $value =~ s/<!--(.|\n)*-->//g;

        if ($allow_html != 1) {
            $value =~ s/<([>]|\n)*>//g;
        }
        else {
            unless ($name eq 'body') {
                $value =~ s/<([>]|\n)*>//g;
            }
        }

        $FORM{$name} = $value;
    }
}

#####
# Get Variables

```

```

sub get_variables {

    if ($FORM{'followup'}) {
        $followup = "1";
        @followup_num = split(/,/, $FORM{'followup'});
        $num_followups = @followups = @followup_num;
        $last_message = pop(@followups);
        $origdate = "$FORM{'origdate'}";
        $origname = "$FORM{'origname'}";
        $origsubject = "$FORM{'origsubject'}";
    }
    else {
        $followup = "0";
    }

    if ($FORM{'name'}) {
        $name = "$FORM{'name'}";
        $name =~ s/"//g;
        $name =~ s/<//g;
        $name =~ s/>//g;
        $name =~ s/\\&//g;
    }
    else {
        &error(no_name);
    }

    if ($FORM{'email'} =~ /.*\@.*\..*/) {
        $email = "$FORM{'email'}";
    }

    if ($FORM{'subject'}) {
        $subject = "$FORM{'subject'}";
        $subject =~ s/\\&/\\&\\&/g;
        $subject =~ s/"\\/\\"/g;
    }
    else {
        &error(no_subject);
    }

    if ($FORM{'url'} =~ /.*\:.*\..*/ && $FORM{'url_title'}) {
        $message_url = "$FORM{'url'}";
        $message_url_title = "$FORM{'url_title'}";
    }

    if ($FORM{'img'} =~ /.*tp:\\\\.*/) {
        $message_img = "$FORM{'img'}";
    }

    if ($FORM{'body'}) {
        $body = "$FORM{'body'}";
        $body =~ s/\\cM//g;
        $body =~ s/\\n\\n/<p>/g;
        $body =~ s/\\n/<br>/g;

        $body =~ s/&lt;/>/g;
        $body =~ s/&gt;/>/g;
        $body =~ s/&quot;/"/g;
    }
}

```



```

else {
    &error(no_body);
}

if ($quote_text == 1) {
    $hidden_body = "$body";
    $hidden_body =~ s/</&lt;/g;
    $hidden_body =~ s/>/&gt;/g;
    $hidden_body =~ s/" /&quot;/g;
}

($sec,$min,$hour,$mday,$mon,$year,$yday,$isdst) =
localtime(time);

if ($sec < 10) {
    $sec = "0$sec";
}
if ($min < 10) {
    $min = "0$min";
}
if ($hour < 10) {
    $hour = "0$hour";
}
if ($mon < 10) {
    $mon = "0$mon";
}
if ($mday < 10) {
    $mday = "0$mday";
}

$month = ($mon + 1);

@months =
("January", "February", "March", "April", "May", "June", "July", "August",
"September", "October", "November", "December");

if ($use_time == 1) {
    $date = "$hour\: $min\: $sec $month/$mday/$year";
}
else {
    $date = "$month/$mday/$year";
}
chop($date) if ($date =~ /\n$/);

$long_date = "$months[$mon] $mday, 19$year at
$hour\: $min\: $sec";
}

#####
# New File Subroutine

sub new_file {

    open(NEWFILE, ">$basedir/$mesgdir/$num\.$ext") || die $!;
    print NEWFILE "<html>\n";
    print NEWFILE "    <head>\n";
    print NEWFILE "        <title>$subject</title>\n";
    print NEWFILE "    </head>\n";
    print NEWFILE "    <body>\n";

```

```

print NEWFILE "      <center>\n";
print NEWFILE "      <h1>$subject</h1>\n";
print NEWFILE "      </center>\n";
print NEWFILE "<hr size=7 width=75%>\n";
if ($show_faq == 1) {
    print NEWFILE "<center>[ <a href=\"#followups\">Follow
Ups</a> ] [ <a href=\"#postfp\">Post Followup</a> ] [ <a
href=\"$baseurl/$mesgfile\">$title</a> ] [ <a
href=\"$baseurl/$faqfile\">FAQ</a> ]</center>\n";
}
else {
    print NEWFILE "<center>[ <a href=\"#followups\">Follow
Ups</a> ] [ <a href=\"#postfp\">Post Followup</a> ] [ <a
href=\"$baseurl/$mesgfile\">$title</a> ]</center>\n";
}
print NEWFILE "<hr size=7 width=75%><p>\n";

print NEWFILE "Posted by ";

if ($email) {
    print NEWFILE "<a href=\"mailto:$email\">$name</a> on
$long_date:<p>\n";
}
else {
    print NEWFILE "$name on $long_date:<p>\n";
}

if ($followup == 1) {
    print NEWFILE "In Reply to: <a
href=\"$last_message.$ext\">$origsubject</a> posted by ";

    if ($origemail) {
        print NEWFILE "<a href=\"$origemail\">$origname</a> on
$origdate:<p>\n";
    }
    else {
        print NEWFILE "$origname on $origdate:<p>\n";
    }
}

if ($message_img) {
    print NEWFILE "<center><img
src=\"$message_img\"></center><p>\n";
}
print NEWFILE "$body\n";
print NEWFILE "<br>\n";
if ($message_url) {
    print NEWFILE "<ul><li><a
href=\"$message_url\">$message_url_title</a></li>\n";
}
print NEWFILE "<br><hr size=7 width=75%><p>\n";
print NEWFILE "<a name=\"followups\">Follow Ups:</a><br>\n";
print NEWFILE "<ul><!--insert: $num-->\n";
print NEWFILE "</ul><!--end: $num-->\n";
print NEWFILE "<br><hr size=7 width=75%><p>\n";
print NEWFILE "<a name=\"postfp\">Post a Followup</a><p>\n";
print NEWFILE "<form method=POST action=\"$cgi_url\">\n";
print NEWFILE "<input type=hidden name=\"followup\" value=\"\"";
if ($followup == 1) {

```



```

        foreach $followup_num (@followup_num) {
            print NEWFILE "$followup_num,";
        }
    }
    print NEWFILE "$num\">\n";
    print NEWFILE "<input type=hidden name=\"origname\"
value=\"$name\">\n";
    if ($email) {
        print NEWFILE "<input type=hidden name=\"origemail\"
value=\"$email\">\n";
    }
    print NEWFILE "<input type=hidden name=\"origsubject\"
value=\"$subject\">\n";
    print NEWFILE "<input type=hidden name=\"origdate\"
value=\"$long_date\">\n";
    print NEWFILE "Name: <input type=text name=\"name\"
size=50><br>\n";
    print NEWFILE "E-Mail: <input type=text name=\"email\"
size=50><p>\n";
    if ($subject_line == 1) {
        if ($subject_line =~ /^Re:/) {
            print NEWFILE "<input type=hidden name=\"subject\"
value=\"$subject\">\n";
            print NEWFILE "Subject: <b>$subject</b><p>\n";
        }
        else {
            print NEWFILE "<input type=hidden name=\"subject\"
value=\"Re: $subject\">\n";
            print NEWFILE "Subject: <b>Re: $subject</b><p>\n";
        }
    }
    elsif ($subject_line == 2) {
        print NEWFILE "Subject: <input type=text name=\"subject\"
size=50><p>\n";
    }
    else {
        if ($subject =~ /^Re:/) {
            print NEWFILE "Subject: <input type=text
name=\"subject\" value=\"$subject\" size=50><p>\n";
        }
        else {
            print NEWFILE "Subject: <input type=text name=\"subject\"
value=\"Re: $subject\" size=50><p>\n";
        }
    }
}
print NEWFILE "Comments:<br>\n";
print NEWFILE "<textarea name=\"body\" COLS=50 ROWS=10>\n";
if ($quote_text == 1) {
    @chunks_of_body = split(/\&lt\;p\&gt\;/,$hidden_body);
    foreach $chunk_of_body (@chunks_of_body) {
        @lines_of_body = split(/\&lt\;br\&gt\;/,$chunk_of_body);
        foreach $line_of_body (@lines_of_body) {
            print NEWFILE ": $line_of_body\n";
        }
        print NEWFILE "\n";
    }
}
print NEWFILE "</textarea>\n";
print NEWFILE "<p>\n";

```

```

    print NEWFILE "Optional Link URL: <input type=text name=\"url\"
size=50><br>\n";
    print NEWFILE "Link Title: <input type=text name=\"url_title\"
size=48><br>\n";
    print NEWFILE "Optional Image URL: <input type=text name=\"img\"
size=49><p>\n";
    print NEWFILE "<input type=submit value=\"Submit Follow Up\">
<input type=reset>\n";
    print NEWFILE "<p><hr size=7 width=75%>\n";
    if ($show_faq == 1) {
        print NEWFILE "<center>[ <a href=\"#followups\">Follow
Ups</a> ] [ <a href=\"#postfp\">Post Followup</a> ] [ <a
href=\"$baseurl/$mesgfile\">$title</a> ] [ <a
href=\"$baseurl/$faqfile\">FAQ</a> ]</center>\n";
    }
    else {
        print NEWFILE "<center>[ <a href=\"#followups\">Follow
Ups</a> ] [ <a href=\"#postfp\">Post Followup</a> ] [ <a
href=\"$baseurl/$mesgfile\">$title</a> ]</center>\n";
    }
    print NEWFILE "</body></html>\n";
    close(NEWFILE);
}

```

```

#####
# Main WWWBoard Page Subroutine

```

```

sub main_page {
    open(MAIN, "$basedir/$mesgfile") || die $!;
    @main = <MAIN>;
    close(MAIN);

    open(MAIN, ">$basedir/$mesgfile") || die $!;
    if ($followup == 0) {
        foreach $main_line (@main) {
            if ($main_line =~ /<!--begin-->/) {
                print MAIN "<!--begin-->\n";
                print MAIN "<!--top: $num--><li><a
href=\"$mesgdir/$num\".\"$ext\">$subject</a> - <b>$name</b>
<i>$date</i>\n";
                print MAIN "(<!--responses: $num-->0)\n";
                print MAIN "<ul><!--insert: $num-->\n";
                print MAIN "</ul><!--end: $num-->\n";
            }
            else {
                print MAIN "$main_line";
            }
        }
    }
    else {
        foreach $main_line (@main) {
            $work = 0;
            if ($main_line =~ /<ul><!--insert: $last_message-->/) {
                print MAIN "<ul><!--insert: $last_message-->\n";
                print MAIN "<!--top: $num--><li><a
href=\"$mesgdir/$num\".\"$ext\">$subject</a> - <b>$name</b>
<i>$date</i>\n";
                print MAIN "(<!--responses: $num-->0)\n";
                print MAIN "<ul><!--insert: $num-->\n";
            }
        }
    }
}

```



```

        print MAIN "</ul><!--end: $num-->\n";
    }
    elsif ($main_line =~ /\(<!--responses: (.*)-->(.*?)\)/) {
        $response_num = $1;
        $num_responses = $2;
        $num_responses++;
        foreach $followup_num (@followup_num) {
            if ($followup_num == $response_num) {
                print MAIN "(<!--responses: $followup_num--
>$num_responses)\n";
                $work = 1;
            }
        }
        if ($work != 1) {
            print MAIN "$main_line";
        }
    }
    else {
        print MAIN "$main_line";
    }
}
close(MAIN);
}

```

```

#####
# Add Followup Threading to Individual Pages
sub thread_pages {

```

```

    foreach $followup_num (@followup_num) {
        open(FOLLOWUP, "$basedir/$mesgdir/$followup_num\.$ext");
        @followup_lines = <FOLLOWUP>;
        close(FOLLOWUP);

        open(FOLLOWUP, ">$basedir/$mesgdir/$followup_num\.$ext");
        foreach $followup_line (@followup_lines) {
            $work = 0;
            if ($followup_line =~ /<ul><!--insert: $last_message-->/)
            {
                print FOLLOWUP "<ul><!--insert: $last_message-->\n";
                print FOLLOWUP "<!--top: $num--><li><a
href=\"$num\.$ext\">$subject</a> <b>$name</b> <i>$date</i>\n";
                print FOLLOWUP "(<!--responses: $num-->0)\n";
                print FOLLOWUP "<ul><!--insert: $num-->\n";
                print FOLLOWUP "</ul><!--end: $num-->\n";
            }
            elsif ($followup_line =~ /\(<!--responses: (.*)-->(.*?)\)/)
            {
                $response_num = $1;
                $num_responses = $2;
                $num_responses++;
                foreach $followup_num (@followup_num) {
                    if ($followup_num == $response_num) {
                        print FOLLOWUP "(<!--responses: $followup_num--
>$num_responses)\n";
                        $work = 1;
                    }
                }
                if ($work != 1) {

```

```

        print FOLLOWUP "$followup_line";
    }
}
else {
    print FOLLOWUP "$followup_line";
}
}
close(FOLLOWUP);
}
}

sub return_html {
    print "Content-type: text/html\n\n";
    print "<html><head><title>Message Added:
$subject</title></head>\n";
    print "<body><center><h1>Message Added:
$subject</h1></center>\n";
    print "The following information was added to the message
board:<p><hr size=7 width=75%><p>\n";
    print "<b>Name:</b> $name<br>\n";
    print "<b>E-Mail:</b> $email<br>\n";
    print "<b>Subject:</b> $subject<br>\n";
    print "<b>Body of Message:</b><p>\n";
    print "$body<p>\n";
    if ($message_url) {
        print "<b>Link:</b> <a
href=\"\$message_url\">$message_url_title</a><br>\n";
    }
    if ($message_img) {
        print "<b>Image:</b> <img src=\"\$message_img\"><br>\n";
    }
    print "<b>Added on Date:</b> $date<p>\n";
    print "<hr size=7 width=75%>\n";
    print "<center>[ <a href=\"\$baseurl/$mesgdir/$num\".\"$ext\">Go to
Your Message</a> ] [ <a href=\"\$baseurl/$mesgfile\">$title</a>
]</center>\n";
    print "</body></html>\n";
}

sub increment_num {
    open(NUM,">$basedir/$datafile") || die $!;
    print NUM "$num";
    close(NUM);
}

sub error {
    $error = $_[0];

    print "Content-type: text/html\n\n";

    if ($error eq 'no_name') {
        print "<html><head><title>$title ERROR: No
Name</title></head>\n";
        print "<body><center><h1>ERROR: No Name</h1></center>\n";
        print "You forgot to fill in the 'Name' field in your
posting. Correct it below and re-submit. The necessary fields
are: Name, Subject and Message.<p><hr size=7 width=75%><p>\n";
        &rest_of_form;
    }
}

```



```

    elsif ($error eq 'no_subject') {
        print "<html><head><title>$title ERROR: No
Subject</title></head>\n";
        print "<body><center><h1>ERROR: No Subject</h1></center>\n";
        print "You forgot to fill in the 'Subject' field in your
posting. Correct it below and re-submit. The necessary fields
are: Name, Subject and Message.<p><hr size=7 width=75%><p>\n";
        &rest_of_form;
    }
    elsif ($error eq 'no_body') {
        print "<html><head><title>$title ERROR: No
Message</title></head>\n";
        print "<body><center><h1>ERROR: No Message</h1></center>\n";
        print "You forgot to fill in the 'Message' field in your
posting. Correct it below and re-submit. The necessary fields
are: Name, Subject and Message.<p><hr size=7 width=75%><p>\n";
        &rest_of_form;
    }
    else {
        print "ERROR! Undefined.\n";
    }
    exit;
}

sub rest_of_form {

    print "<form method=POST action=\"\$cgi_url\">\n";

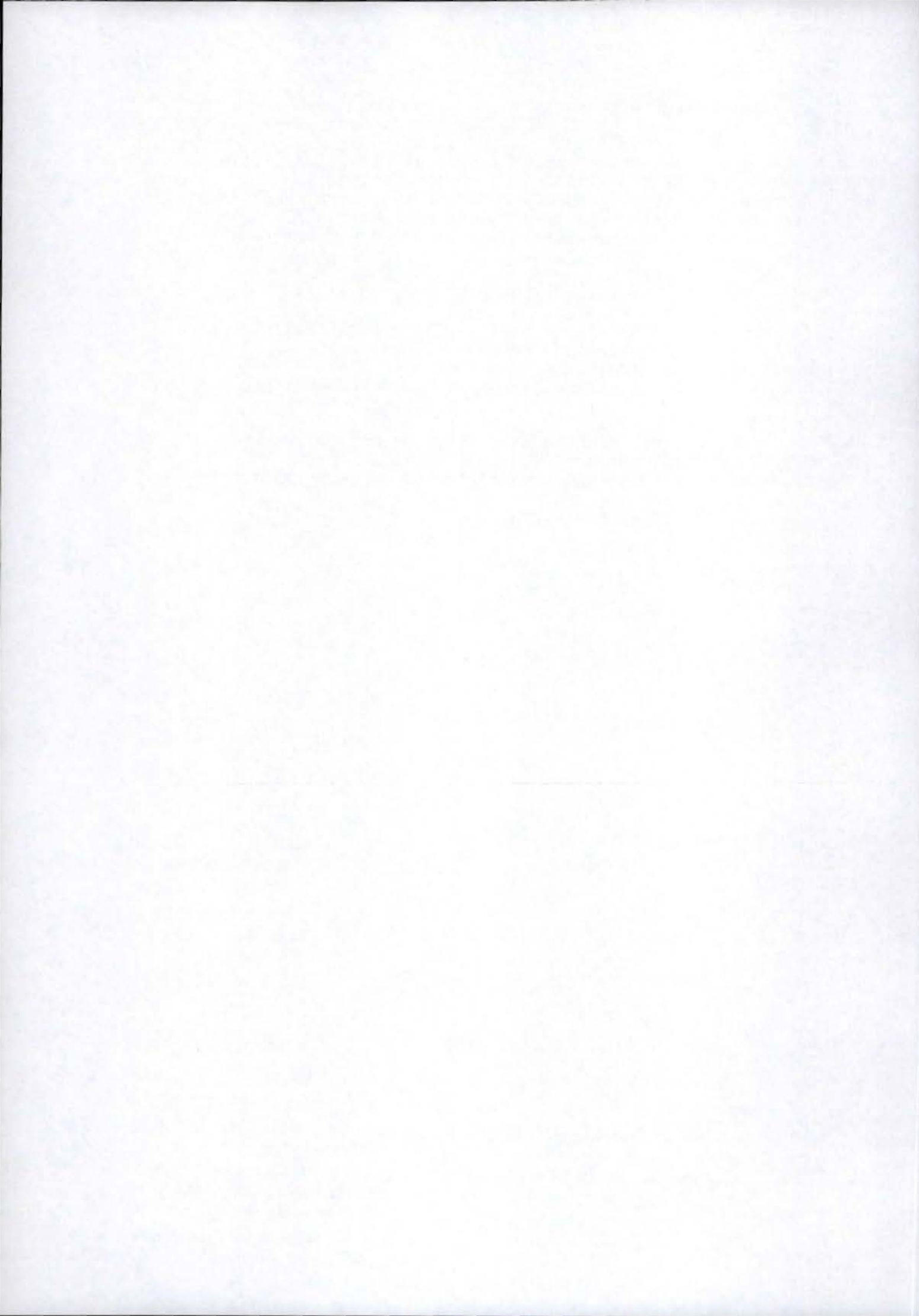
    if ($followup == 1) {
        print "<input type=hidden name=\"origsubject\"
value=\"\$FORM{'origsubject'}\">\n";
        print "<input type=hidden name=\"origname\"
value=\"\$FORM{'origname'}\">\n";
        print "<input type=hidden name=\"origemail\"
value=\"\$FORM{'origemail'}\">\n";
        print "<input type=hidden name=\"origdate\"
value=\"\$FORM{'origdate'}\">\n";
        print "<input type=hidden name=\"followup\"
value=\"\$FORM{'followup'}\">\n";
    }
    print "Name: <input type=text name=\"name\"
value=\"\$FORM{'name'}\" size=50><br>\n";
    print "E-Mail: <input type=text name=\"email\"
value=\"\$FORM{'email'}\" size=50><p>\n";
    if ($subject_line == 1) {
        print "<input type=hidden name=\"subject\"
value=\"\$FORM{'subject'}\">\n";
        print "Subject: <b>$FORM{'subject'}</b><p>\n";
    }
    else {
        print "Subject: <input type=text name=\"subject\"
value=\"\$FORM{'subject'}\" size=50><p>\n";
    }
    print "Message:<br>\n";
    print "<textarea COLS=50 ROWS=10 name=\"body\">\n";
    $FORM{'body'} =~ s/</&lt;/g;
    $FORM{'body'} =~ s/>/&gt;/g;
    $FORM{'body'} =~ s/" /&quot;/g;
    print "$FORM{'body'}\n";
}

```

```

    print "</textarea><p>\n";
    print "Optional Link URL: <input type=text name=\"url\"
value=\"${FORM{'url'}}\" size=45><br>\n";
    print "Link Title: <input type=text name=\"url_title\"
value=\"${FORM{'url_title'}}\" size=50><br>\n";
    print "Optional Image URL: <input type=text name=\"img\"
value=\"${FORM{'img'}}\" size=45><p>\n";
    print "<input type=submit value=\"Post Message\"> <input
type=reset>\n";
    print "</form>\n";
    print "<br><hr size=7 width=75%>\n";
    if ($show_faq == 1) {
        print "<center>[ <a href=\"#followups\">Follow Ups</a> ] [ <a
href=\"#postfp\">Post Followup</a> ] [ <a
href=\"$baseurl/$mesgfile\">$title</a> ] [ <a
href=\"$baseurl/$faqfile\">FAQ</a> ]</center>\n";
    }
    else {
        print "<center>[ <a href=\"#followups\">Follow Ups</a> ] [ <a
href=\"#postfp\">Post Followup</a> ] [ <a
href=\"$baseurl/$mesgfile\">$title</a> ]</center>\n";
    }
    print "</body></html>\n";
}

```

APPENDIX D

Computer Conferencing discussion

Computer Conference for the FUNDP

Below is WWWBoard Version 2.0 ALPHA 1.

[[Post Message](#)] [[FAQ](#)]

- [l'éthique dans les pratiques commerciales](#) - **Laurent** 14:57:54 4/22/97 (0)
- [Comités d'éthique](#) - **Geoffroy** 09:52:53 4/21/97 (1)
 - Re: [Comités d'éthique](#) - **Bashkim** 10:11:34 4/22/97 (0)
- [Ethique de l'Informatique?](#) - **BAULER Pascal** 16:54:15 4/17/97 (5)
 - Re: [Ethique de l'Informatique?](#) - **laurent** 15:10:29 4/22/97 (0)
 - Re: [Ethique de l'Informatique?](#) - **Luc** 03:39:53 4/22/97 (1)
 - Re: [Ethique de l'Informatique?](#) - **Bauler Pascal** 15:49:31 4/23/97 (0)
 - Re: [Ethique de l'Informatique?](#) - **Geoffroy** 07:13:02 4/18/97 (1)
 - Re: [Ethique de l'Informatique?](#) - **Bauler Pascal** 15:32:07 4/23/97 (0)
- [L'ethique c'est quoi??](#) - **Denise Kohl** 04:47:45 4/08/97 (6)
 - Re: [L'ethique c'est quoi??](#) - **Nathalie Fejza** 06:35:41 4/21/97 (1)
 - Re: [L'ethique c'est quoi??](#) - **Luc** 02:54:42 4/23/97 (0)
 - Re: [L'ethique c'est quoi??](#) - **Bashkim Bitiki** 07:41:09 4/08/97 (3)
 - Re: [L'ethique c'est quoi??](#) - **Geoffroy** 06:18:49 4/17/97 (0)
 - Re: [L'ethique c'est quoi??](#) - **Jean-Luc** 10:46:48 4/16/97 (0)

l'éthique dans les pratiques commerciales

[[Follow Ups](#)] [[Post Followup](#)] [[On-Line Asynchronous Computer Conference](#)]

Posted by **Laurent** on April 22, 1997 at 14:57:54:

Salut à tous,

Je vois que l'ambiance du forum est chaude...
Tout aussi chaude que les questions d'éthique en matière commerciale! Je me suis balladé et perdu du côté de l'"ethics in Management". Quelques articles qui s'y trouvent traitent des pratiques de publicité peu orthodoxe.

La pratique montre en effet que la publicité a plus d'impact sur le public si elle traite de problèmes sociaux tels que la drogue, le sexe, le sida ou encore le tiers monde.

Notre société évolue et repousse sans cesse les frontières du tabou. Peut-on tolérer, par exemple, que Benetton puisse utiliser le SIDA ou la violence, que Levis puisse défendre la cause des homosexuels dans le seuls but d'augmenter leurs CA?

Mais des pratiques sont encore plus subtilement hypocrites: certaines entreprises vous promettent par exemple de verser 1 fr. au tiers monde pour chaque paquet de corn flakes vendu. C'est un investissement comme un autre qui rapporte en fin de compte plus que ce qui a été dépensé...

Laurent.

Comités d'éthique

[[Follow Ups](#)] [[Post Followup](#)] [[On-Line Asynchronous Computer Conference](#)]

Posted by **Geoffroy** on April 21, 1997 at 09:52:53:

Etant donné, comme plusieurs personnes (dont moi) l'ont soulevé, le caractère personnel de l'éthique, comment se fait-il qu'il existe des comités d'éthique ?

En effet, c'est alors des groupement de personnes, chacun avec leur propre vision de l'éthique, qui décident que les autres ne peuvent pas avoir leur propre vision des choses...

Les plus éminents spécialistes faisant souvent partie de comités d'éthique propre à leur discipline, que faut-il comprendre ? que ce sont des idiots fermés au monde et aux idées des autres ? Ou plutôt qu'ils ont une autre vision des choses et que peut-être l'éthique n'est pas si personnelle et libre que cela ?

Question ouverte, j'attend vos commentaires

Geoffroy

Re: Comités d'éthique

[[Follow Ups](#)] [[Post Followup](#)] [[On-Line Asynchronous Computer Conference](#)]

Posted by **Bashkim** on April 22, 1997 at 10:11:34:

In Reply to: **Comités d'éthique** posted by Geoffroy on April 21, 1997 at 09:52:53:

Je ne crois pas vraiment que l'éthique est quelque chose de personnelle, je crois que l'éthique est très liée avec l'environnement dans lequel nous avons vécu, et nous vivons.

En plus l'éthique je ne crois qu'elle pourrait être imposée par des 'comités d'éthique' parce que pour que quelqu'un puisse apporter des solutions (dans ce cas de l'éthique), il doit avoir le soutien de la masse. Et ceci est très difficile à réaliser, si nous prenons en considération la variété et les différences qui existent entre les gens.

Ces comités d'éthique peuvent peut être apporter des nouvelles solutions, mais il faut voir encore si les gens vont les accepter. Dans tous les cas on voit bien qu'ils existent déjà des différents codes d'éthiques, mais qui sont rarement respectés, ce qui est vraiment dommage.

Mais la vie est ainsi, je ne crois pas tellement qu'on pourrait y changer quelque chose, à part sensibiliser les gens.

Ethique de l'Informatique?

[Follow Ups] [Post Followup] [On-Line Asynchronous Computer Conference]

Posted by **BAULER Pascal** on April 17, 1997 at 16:54:15:

Moi personnellement, je considère l'informatique comme une science qui est en train de se développer dans tous les domaines imaginables. L'informatique permet de faciliter considérablement la vie des utilisateurs et de chaque être humain.

De plus, je suis convaincu qu'on doit laisser toutes les libertés à l'expansion d'une science, à condition qu'il n'existe pas de danger réel pour l'humanité, ou des individus.

En ce qui concerne l'informatique en tant que science, il est difficilement imaginable qu'il existe un danger réel pour qui que ce soit.

Les seuls aspects qu'on peut reprocher à l'informatique, concernent l'exploitation malicieuse des résultats des recherches en informatique. Ainsi il serait quand-même étrange de culpabiliser les chercheurs du CERN (développeurs du WEB) pour la distribution d'images pornographiques sur Internet.

Je considère donc que les aspects éthiques ne doivent pas imposer des contraintes à la recherche en informatique. Il faut plutôt s'assurer que les utilisateurs ne se servent pas du matériel informatique à des fins illégales.

Par conséquent le terme éthique de l'informatique me semble pas très bien choisi. Ainsi, les problèmes éthiques en informatique sont juste un exemple de problèmes éthiques qui ont leur origine dans la société.

Pascal Bauler

Re: Ethique de l'Informatique?

[Follow Ups] [Post Followup] [On-Line Asynchronous Computer Conference]

Posted by **laurent** on April 22, 1997 at 15:10:29:

In Reply to: **Ethique de l'Informatique?** posted by BAULER Pascal on April 17, 1997 at 16:54:15:

: Moi personnellement, je considère l'informatique comme
: une science qui est en train de se développer dans tous
: les domaines imaginables. L'informatique permet de
: faciliter considérablement la vie des utilisateurs et
: de chaque être humain.

: De plus, je suis convaincu qu'on doit laisser toutes
: les libertés à l'expansion d'une science, à condition
: qu'il n'existe pas de danger réel pour l'humanité, ou
: des individus.
: En ce qui concerne l'informatique en tant que science,
: il est difficilement imaginable qu'il existe un danger
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: Les seuls aspects qu'on peut reprocher à
: l'informatique, concernent l'exploitation malicieuse
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: serait quand-même étrange de culpabiliser les
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: pas imposer des contraintes à la recherche en
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: utilisateurs ne se servent pas du matériel
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: Par conséquent le terme éthique de l'informatique me
: semble pas très bien choisi. Ainsi, les problèmes
: éthiques en informatique sont juste un exemple de
: problèmes éthiques qui ont leur origine dans la
: société.
: Pascal Bauler

Je pense que l'éthique de l'informatique, comme toute autre

discipline, existe. L'éthique, c'est notre état d'ame,
notre opinion que nous portons sur les choses.

Si chacun d'entre nous avait un état d'ame sur tous
les phénomènes qui nous entourent, l'éthique ne serait
qu'un problème qui passerait inaperçu. Il n'en est rien!

L'utilisation sans état d'ame de l'informatique peut s'avérer
être destructrice. Ceux qui ont des états d'ame ont
le devoir de freiner ceux qui en sont dépourvu...

... C'est l'enjeu de l'éthique!

Re: Ethique de l'Informatique?

[[Follow Ups](#)] [[Post Followup](#)] [[On-Line Asynchronous Computer Conference](#)]

Posted by **Luc** on April 22, 1997 at 03:39:53:

In Reply to: **Ethique de l'Informatique?** posted by BAULER Pascal on April 17, 1997 at 16:54:15:

: Moi personnellement, je considère l'informatique comme
: une science qui est en train de se développer dans tous
: les domaines imaginables. (...)
: De plus, je suis convaincu qu'on doit laisser toutes
: les libertés à l'expansion d'une science, à condition
: qu'il n'existe pas de danger réel pour l'humanité, ou
: des individus.
: En ce qui concerne l'informatique en tant que science,
: il est difficilement imaginable qu'il existe un danger
: réel pour qui que ce soit. (...)
Qu'entends-tu par l'informatique en tant que science ?
Une science peut-elle être considérée pour elle-même,
c'est-à-dire sans regard à ses applications ?

Pour ma part, je pense que l'éthique de l'informatique
doit définir non seulement des directions que
prennent la "science informatique" pour éviter des abuts
et garder une certaine "égalité devant l'informatique",
mais aussi
donner des lignes de conduite (des garde-fous) qui
dirigent les personnes dans leur développement.

Les utilisateurs ne sont pas les seuls responsables
de l'utilisation des logiciels. Je pense que les
développeurs ont une bien plus grande responsabilité :
ils peuvent éviter les usages abusifs, et surtout
ne pas programmer des usages illégaux ou inéquitables.
Luc Lejoly

Follow Ups:

Re: Ethique de l'Informatique? **Bauler Pascal** 15:49:31 4/23/97 (0)

Re: Ethique de l'Informatique?

[Follow Ups] [Post Followup] [On-Line Asynchronous Computer Conference]

Posted by **Bauler Pascal** on April 23, 1997 at 15:49:31:

In Reply to: **Re: Ethique de l'Informatique?** posted by Luc on April 22, 1997 at 03:39:53:

: : Moi personnellement, je considère l'informatique comme
: : une science qui est en train de se développer dans tous
: : les domaines imaginables. (...)
: : De plus, je suis convaincu qu'on doit laisser toutes
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: : il est difficilement imaginable qu'il existe un danger
: : réel pour qui que ce soit. (...)
: : Qu'entends-tu par l'informatique en tant que science ?
: : Une science peut-elle être considérée pour elle-même,
: : c'est-à-dire sans regard à ses applications ?

Avec 'informatique, en tant que science', je
considère la recherche en informatique. Donc en
fait les résultats de thèses de doctorat.

: Pour ma part, je pense que l'éthique de l'informatique
: doit définir non seulement des directions que
: prennent la "science informatique" pour éviter des abus
: et garder une certaine "égalité devant l'informatique",
: mais aussi
: donner des lignes de conduite (des garde-fous) qui
: dirigent les personnes dans leur développement.

: Les utilisateurs ne sont pas les seuls responsables
: de l'utilisation des logiciels. Je pense que les
: développeurs ont une bien plus grande responsabilité :
: ils peuvent éviter les usages abusifs, et surtout
: ne pas programmer des usages illégaux ou inéquitables.
: Luc Lejoly

Je suis bien d'accord qu'il ne faut pas développer n'importe quel logiciel.
Mais il faut en aucun cas limiter la recherche comme définit quelques
lignes plus haut. Une limitation des possibilités de recherche va

nuire considérablement au développement d'une science. De même cette intervention externe n'est employée dans aucune science à l'exception si l'humanité est réellement menacée (clonage des hommes)

Comme autre exemple on peut citer la physique nucléaire. On ne peut pas interdire la physique nucléaire, par le simple risque que suite à ces recherches des bombes atomiques, plus sophistiquées puissent être construites.

Pascal Bauler

Re: Ethique de l'Informatique?

[[Follow Ups](#)] [[Post Followup](#)] [[On-Line Asynchronous Computer Conference](#)]

Posted by **Geoffroy** on April 18, 1997 at 07:13:02:

In Reply to: **Ethique de l'Informatique?** posted by BAULER Pascal on April 17, 1997 at 16:54:15:

Selon moi, ethique de l'informatique est un terme interessant.

Comme je l'ai deja ecrit, il n'y a pas que les comportements dangereux qui manquent d'ethique. Tout comportement atteignant la liberte ou l'integrite (quelle qu'elle soit) d'autrui manque d'ethique.

L'informaticien qui cree un virus manque, selon ma definition du terme, d'ethique, puisque sa liberte de detruire des information va contre la liberte d'autres personnes à collecter et enregistrer ces information. Et pourtant un virus informatique n'est pas dangereux.

Meme si...

Meme si tout peut devenir dangereux. Imaginez un peu ce virus dont je parle plus haut qui se repend.

Il se repend tant et si bien qu'il touche le centre informatique d'une centrale nucleaire...

Il ne faut pas grand chose pour imaginer des scenarios catastrophes.

L'informatique est dangereuse si on s'en sert de certaines manieres.

Comme vous pouvez l'imaginer, les dangers de l'informatique ne sont pas des moindres. Et si il faut que quelque chose devienne dangereux pour manquer d'ethique, mefiez vous des detours de l'informatique...

Geoffroy

Re: Ethique de l'Informatique?

[[Follow Ups](#)] [[Post Followup](#)] [[On-Line Asynchronous Computer Conference](#)]

Posted by **Bauler Pascal** on April 23, 1997 at 15:32:07:

In Reply to: **Re: Ethique de l'Informatique?** posted by Geoffroy on April 18, 1997 at 07:13:02:

: Selon moi, ethique de l'informatique est un terme
: interessant.
: Comme je l'ai deja ecrit, il n'y a pas que les
: comportements dangereux qui manquent d'ethique.
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: l'informatique ne sont pas des moindres. Et si il
: faut que quelque chose devienne dangereux pour
: manquer d'ethique, mefiez vous des detours de
: l'informatique...

: Geoffroy

Pour commencer, je ne considere pas les virus
comme un problème réel pour l'informatique.

Ainsi, les virus sont quasiment inexistent sur des systèmes d'exploitations convenables, qui intègrent un certain niveau de sécurité.

Néanmoins, je crois que ma remarque, concernant l'éthique peut de nouveau s'appliquer sur les virus.

Ainsi, je voulais considérer 2 types de virus.

- 1) Les virus qui veulent souligner l'existence de problèmes de sécurité flagrant, mais ne causent pas de dommages réels ou définitifs. (comme exemples je voulais citer le fameux WORM qui a bloqué quasiment l'Internet complet, pendant une journée complète (années 80) ainsi que les pages WEB, qui vous affichent vos mots de passe de Windows et Windows NT)
- 2) Comme deuxième catégorie de virus, on a les virus usuels sur les PC tournant sous MS Windows.. qui essaient de rendre l'ordinateur inutilisable.

Ainsi le premier type de virus, est généralement développé par des spécialistes, qui veulent juste pousser les administrateurs à protéger leurs systèmes. Notons qu'il existe des groupes de spécialistes qui analysent continuellement les points d'attaque des systèmes (comme par exemple sendmail, pour lequel encore actuellement des problèmes sont rencontrés). Une fois de tels problèmes rencontrés, un rapport est rédigé et la faute est généralement corrigée. En résumé, il s'agit donc d'un travail de spécialistes, qui cherchent des problèmes dans les systèmes d'exploitation.

En ce qui concerne le deuxième type de virus, le principe est généralement très différent. Ces virus n'ont pas besoin de rechercher des lacunes dans la sécurité du système, mais exploitent des aspects des PC bien connus et bien documentés. Vu que les OS ne connaissent pas la notion de sécurité, le virus a toutes les possibilités dès qu'il s'est installé sur le disque dur. Donc ce type de virus, est de nouveau une application des résultats de recherches informatiques. (code qui se modifie soi-même, registres spéciaux dans le BIOS), mais en gros il n'a rien de nouveau qui se trouve dans un virus PC.

Il serait donc absurde d'interdire aux chercheurs, d'essayer de détecter des lacunes de sécurité dans les systèmes, juste pour éviter qu'un programmeur malveillant puisse exploiter les résultats de la recherche. Il vaut mieux encourager les chercheurs, afin qu'on aboutisse à des systèmes n'offrant qu'un minimum de points d'attaque. Suite, au travail des chercheurs, les points d'attaque d'un système Unix sont assez limités, et les virus sont presque inexistent dans ces domaines de l'informatique. Notons que dans des environnement de recherche presque toutes les installations informatiques tournent sous Unix.

Pascal Bauler

L'ethique c'est quoi??

[[Follow Ups](#)] [[Post Followup](#)] [[On-Line Asynchronous Computer Conference](#)]

Posted by **Denise Kohl** on April 08, 1997 at 04:47:45:

En parcourant les textes du meta-browser je trouvais que dans les differents textes, le mot "ethique" est employe de maniere differente. La citation qui suit, definit un de ces points de vue:

MacIntyre, one of the most thorough-going of these critics, drew on Aristotle's approach to ethics and argued that ethics is an aspect of the life of particular communities rather than a body of abstractions with universal application to all persons. He observed that moral rules and principles are always learned in application to particular social circumstances.

Comment voyez-vous (les autres participants) ceci. C'est quoi, l'ethique, un mode d'emploi de ce qu'on peut ou ne peut pas faire pour tout le monde, ou est ce que l'ethique se vit differemment dans les differentes cultures.

Re: L'ethique c'est quoi??

[[Follow Ups](#)] [[Post Followup](#)] [[On-Line Asynchronous Computer Conference](#)]

]

Posted by **Nathalie Fejza** on April 21, 1997 at 06:35:41:

In Reply to: **L'ethique c'est quoi??** posted by Denise Kohl on April 08, 1997 at 04:47:45:

: En parcourant les textes du meta-browser je trouvais que
: dans les differents textes, le mot "ethique" est employe
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: C'est quoi, l'ethique, un mode d'emploi de ce qu'on peut
: ou ne peut pas faire pour tout le monde, ou est ce que
: l'ethique se vit differemment dans les differentes
: cultures.

En fait, lorsqu'on m'a parlé de ce projet de conférence, la première question qui m'est venue à l'esprit a été de savoir comment on pourrait définir l'ethique. Je n'étais donc pas la seule à me la poser.

En y reflechissant, de nombreuses définitions existent, chacune étant plus ou moins liée avec les autres. Ce n'est donc pas l'ethique qui diffère selon l'époque ou le lieu, mais c'est l'interprétation qu'on en fait. Depuis toujours, on interprète les choses afin d'améliorer sa propre situation ; il en a été de même avec l'ethique.

L'Eglise, elle-même, interprète sa propre morale en fonction de l'époque : avant, elle autorisait l'esclavage, aujourd'hui et cela depuis longtemps, elle le refuse.

Le Droit, pendant longtemps, refusait le droit de divorcer aux femmes, mais avec la libéralisation des femmes, il a été amené à l'autoriser,

voire le faciliter.

Les individus interprètent leurs morales en fonction du lieu et de l'époque dans lesquels ils vivent, et cela même s'il existe une éthique quasi-commune grâce à l'internationalisation croissante de nos sociétés. Donc, ceux qui présentent des photos pédophiles ou autres sur le Net ne manquent pas forcément d'éthique. Ils ont, au contraire, interprété celle-ci à leur manière pour en créer une qui leur est propre, même si ce n'est pas la nôtre, ni d'ailleurs la bonne.

En ce sens, l'éthique n'est pas une notion figée mais évolue avec nous. Et cette éthique représente avant-tout le principes dans lesquels et pour lesquels chacun de nous décide de vivre afin d'atteindre son but. Comme nos buts diffèrent les uns des autres, notre idée de l'éthique diffère également.

Re: L'ethique c'est quoi??

[[Follow Ups](#)] [[Post Followup](#)] [[On-Line Asynchronous Computer Conference](#)]

Posted by **Luc** on April 23, 1997 at 02:54:42:

In Reply to: **Re: L'ethique c'est quoi??** posted by Nathalie Fejza on April 21, 1997 at 06:35:41:

: En y réfléchissant, de nombreuses définitions existent, chacune étant
: plus ou moins liée avec les autres. Ce n'est donc pas l'ethique qui
: diffère selon l'époque ou le lieu, mais c'est l'interprétation qu'on
: en fait. Depuis toujours, on interprète les choses afin d'améliorer sa
: propre situation ; il en a été de même avec l'ethique.
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: manquent pas forcément d'ethique. Ils ont, au contraire, interprété
: celle-ci à leur manière pour en créer une qui leur est propre, même si
: ce n'est pas la nôtre, ni d'ailleurs la bonne.

Dans cette optique, quel est le rôle des codes d'éthique ?
Qui doit les edicter ? le plus fort ? le plus representatif ?

Est-il simplement utile de proposer des regles de
conduite si on admet que chacun peut avoir sa propre
éthique.

En d'autres mots, existe-t-il une liberté d'éthique ?

Re: L'ethique c'est quoi??

[[Follow Ups](#)] [[Post Followup](#)] [[On-Line Asynchronous Computer Conference](#)]

Posted by **Bashkim Bitiki** on April 08, 1997 at 07:41:09:

In Reply to: **L'ethique c'est quoi??** posted by Denise Kohl on April 08, 1997 at 04:47:45:

Classiquement l'éthique est définie comme
"la discipline qui traite du bien et du mal
et des devoirs et obligations moraux (WEbster)
ou comme" une idée ou une croyance morale
qui influence attitude, le comportement
ou la philosophie de vie d'un groupe de personnes
(Collins)

Mais ceci peut amener à beaucoup de questions
comme qu'est qui est bien est qu'est qui est mal.

Le bien et le mal sont souvent imposé par la société
où on vit. Ce qui veut dire qu'étant donné qu'il y a
beaucoup des société il y a surement des différents
définitions de bien et de mal, et de cela de l'éthique
en général.

L'application de la peine de mort, la participation ou non dans
une guerre, le piratage des programmes etc,...
ce sont des problèmes qui se posent quotidiennement
mais pour lesquels existent de réponses différents.

Qu'en pensez vous ?

Re: L'ethique c'est quoi??

[[Follow Ups](#)] [[Post Followup](#)] [[On-Line Asynchronous Computer Conference](#)]

Posted by **Geoffroy** on April 17, 1997 at 06:18:49:

In Reply to: **Re: L'ethique c'est quoi??** posted by Bashkim Bitiki on April 08, 1997 at 07:41:09:

Oui mais n'oublions nous pas trop souvent la face 'banale' de l'ethique ?
Les gens aiment bien faire des vagues autour de l'ethique, utiliser des grands mots contre la pedophilie sur le net ou les sites neo-nazi.
Je pense qu'une ethique est personnelle et qu'elle n'est que ce que chacun veut qu'elle soit. Mon ethique, c'est aussi de ne pas bousiller les machines du pool 90 quand je les utilise et pourtant ca ne touche que quelques personnes.
Qui peut me dire que mon ethique est stupide, trop simple, trop ciblee ?
Personne.

C'est a chacun de choisir ou il place son ethique. Nous n'avons pas a dire "Les informaticiens qui placent des images pedophiles sur Internet n'ont pas d'ethique". Ils ont leur propre ethique (je l'espere pour eux).
On a le droit de trouver que les actes d'une personne ne sont pas adaptes a une vie en communaute (par exemple la communaute Internet) et on a le droit, si c'est l'avis du plus grand nombre, de demander a ces personnes de quitter la communaute.
Toutefois, c'est ouvrir la porte a des abus: une majorite nazi se developpe et met tout le monde dehors...
La seule chose qui puisse nous preserver de cela, c'est la tolerance.
La premiere ethique d'une personne, avant de s'elever a grands cris contre les mefaits des autres, devrait etre la tolerance. Parce que nous meme manquons parfois d'ethique au regard des autres.

Ma definition PERSONNELLE (elle n'engage que moi) de l'ethique est donc celle-ci:
" C'est avant tout la tolerance et l'acceptation de la difference des autres.
C'est ensuite la discipline personnelle qui doit nous amener a respecter la liberte des autres.
C'est enfin la possibilite que l'on se donne de discuter avec les autres (meme ceux differents de nous) pour apprendre de nouvelles chose utiles dans notre futur."

Re: L'ethique c'est quoi??

[[Follow Ups](#)] [[Post Followup](#)] [[On-Line Asynchronous Computer Conference](#)]

Posted by **Jean-Luc** on April 16, 1997 at 10:46:48:

In Reply to: **Re: L'ethique c'est quoi??** posted by Bashkim Bitiki on April 08, 1997 at 07:41:09:

: Classiquement l'éthique est définie comme
: "la discipline qui traite du bien et du mal
: et des devoirs et obligations moraux (WEBster)
: ou comme" une idée ou une croyance morale
: qui influence attitude, le comportement
: ou la philosophie de vie d'un groupe de personnes
: (Collins)

: Mais ceci peut amener à beaucoup de questions
: comme qu'est qui est bien est qu'est qui est mal.

: Le bien et le mal sont souvent imposé par la société
: où on vit. Ce qui veut dire qu'étant donné qu'il y a
: beaucoup des société il y a surement des différents
: définitions de bien et de mal, et de cela de l'éthique
: en général.

:
: L'application de la peine de mort, la participation ou non dans
: une guerre, le piratage des programmes etc,...
: ce sont des problèmes qui se posent quotidiennement
: mais pour lesquels existent de réponses différents.

: Qu'en pensez vous ?

Je pense qu'il ne faut peut-être pas regarder
aussi loin. La peine de mort est une chose,
mais l'éthique, comme le dit bien Collins,
est "une idée ou une croyance morale qui
influence l'attitude, le comportement ou
la philosophie de vie d'un groupe de personnes".
A partir de cela, on peut comprendre aisément
qu'elle nous touche partout, à tout instant.
Cela va de choses aussi simples que le respect

des configurations dans les deux pools de PC,
à des choses plus informelles telles que
le respect de règlements d'ordres intérieur
tous aussi informels, mais tellement important...
L'éthique, avant de servir de base à une quelconque
dénonciation, doit avant tout être bien définie,
d'une manière univoque et en des termes acceptés par tous.
C'est sans doute un gros travail, mais je crois que
l'éthique "informatique" devrait être aussi standard
(rires) que le sont les logiciels.
Bye,
JL

APPENDIX E

Computer Conferencing Evaluation

Evaluation questions for the on-line computer conference participants

Answer sheet submitted by: Geoffroy

on: 25th of April 1997

1. *Are you a frequent Internet user ?*

Three to four times per week

2. *Did you like to communicate with other people ?*

Yes, a lot !

3. *Did you encounter any major problems using the Conferencing System*

(Please detail your answer) ?

I find it particularly difficult to follow the discussions inside the conference because every time I connect to the system, all the messages are displayed. There is no differentiation mechanism that indicates what you already read and what still remains to be read...

If you take the 'news' example (trumpet or other news-browser), you may see that each time a message is read, it disappears from the list. The result is that you always know what still needs to be read. The next day, only the 'follow-ups' or the newly posted messages are displayed.

Your system however is more difficult, since one is nearly forced to re-read everything, fearing that one might pass by some follow-ups that were not yet read. I think that it is very difficult to lead a conversation under those circumstances: having to read everything is exhausting and one is never sure about actually having read everything.

I do not dare to imagine what was going to happen if there was a large group of participants inside the conference: one would quickly drop out of the game because you get lost with all those messages...

4. *What did you like / dislike in the experience of reading and answering(or posting) messages ?*

Difficulty to follow the conversations, due to what I already stated in the previous paragraph.

In addition, the aggressiveness of some people towards other's opinions did not really incite to regularly contribute one's own point of view...

5. *Was privacy a major issue for deciding whether to participate or not ?*

No, everyone may know about the identity of all the other and anyway, this does not matter at all.

6. *What do you think about the use of computers for educational purposes ?*

We are doing computer science studies, aren't we ? This should explain the situation...

7. *Would you like having on-line courses at your university ?*

If 'Yes', should these on-line courses substitute or complement the traditional courses ?

No, it is more difficult to follow 'on-line'. Furthermore, it is the teacher who makes the course an interesting one. Personally, I cannot imagine a virtual 'LeCharlier'...

8. *Any further comments about the computer conference ?*

No, I had a lot of fun ! A topic that is easier to get into certainly would have been more of a success.

Evaluation questions for the on-line computer conference participants

Answer sheet submitted by: Pascal

on: 30th of April 1997

1. *Are you a frequent Internet user ?*

Yes, I do use it one hour a day on average.

2. *Did you like to communicate with other people ?*

I think that it is interesting to exchange ideas with other people. Regarding the use of the Internet, ideas may have come from all over the world, which allows to get a large variety of different ideas concerning one same topic.

3. *Did you encounter any major problems using the Conferencing System
(Please detail your answer) ?*

There were actually some details in the electronic conference that caused me trouble. Particularly, the size of the input box where you type in your messages is static and too small for a terminal operating at high-resolution. Similarly, the code-pages created some annoyance when trying to introduce messages created by external editors to the web-browser.

4. *What did you like / dislike in the experience of reading and answering(or posting)
messages ?*

I liked to read messages and to post comments in order to explain and defend my point of view about 'ethics in computer science'.

5. *Was privacy a major issue for deciding whether to participate or not ?*

Personally, privacy issues did not play a major role for me. Anonymity would have been more important if the course topic would have been more serious and might effectively appear to be shocking for some people. (Hence, if we had discussed racism, one might have feared repression or intimidation from neo-nazi groups. Anonymity then would have been a crucial issue.)

6. *What do you think about the use of computers for educational purposes ?*

Computer Science and electronics being the most important global industry, it is necessary to use to a maximum the possibilities offered by computers, particularly in the field of education.

7. *Would you like having on-line courses at your university ?*

If 'Yes', should these on-line courses substitute or complement the traditional courses ?

No, I think that on-line courses only provide limited usefulness. The only advantage would be the possibility to have a quick glance at optional courses which one did not register for. I think that no on-line course may provide further information than those given by a good book. We simply cannot substitute courses by books and thereby eliminate the oral presentations of the teachers. It should be very interesting to provide access to on-line versions of books in order to facilitate the access to information, without being forced to purchase the book.

8. *Any further comments about the computer conference ?*

No, concerning me, there are no further comments that need to be added.

Evaluation questions for the on-line computer conference participants

Answer sheet submitted by: Denise

on: 30th of April 1997

1. Are you a frequent Internet user ?

I only use internet if I'm looking for something in particular, but never for the sole pleasure of 'surfing the Internet'.

2. Did you like to communicate with other people ?

Yes, I do like discussing things with other people. I only think it is too bad we did not try the opportunity to have discussions with other people at a greater distance, people that we do not talk to in everyday life.

3. Did you encounter any major problems using the Conferencing System

(Please detail your answer) ?

No, we did not do the conference !

4. What did you like / dislike in the experience of reading and answering(or posting) messages ?

In the beginning, I did not appreciate the fact that it took over a week for getting a reply or a new question. I think this is not really encouraging to continue discussions...

5. Was privacy a major issue for deciding whether to participate or not ?

Personally, I prefer knowing the people we are having discussions with. Except with Internet, you always know whom you are talking to, then what is the purpose for introducing anonymity (there's already enough of it in our society). However, the possibility should be provided to those who may be able to discuss more openly when staying anonymous.

6. *What do you think about the use of computers for educational purposes ?*

It should be a good idea because this offers whole new dimensions for education. For example, having discussions with other students from other courses, departments and even countries or cultures.

7. *Would you like having on-line courses at your university ?*

If 'Yes', should these on-line courses substitute or complement the traditional courses ?

Yes ! Anyway, it is necessary that this would be a complement without nevertheless representing some additional course work inside our time-schedule.

Inside the framework of a course, for example ethics, it should be interesting to have discussions with other students registered in a similar course but being located in a different country (even more interesting, from another cultural group) , for having some practical overview of the different morals and difficulties (maybe) to find some common ground or compromise.

8. *Any further comments about the computer conference ?*

No !

Evaluation questions for the on-line computer conference participants

Answer sheet submitted by: Jean-Luc

on: 2nd of May 1997

1. *Are you a frequent Internet user ?*

Yes

2. *Did you like to communicate with other people ?*

c.f. next question

3. *Did you encounter any major problems using the Conferencing System*

(Please detail your answer) ?

Yes, I posted an email for participating in a discussion, however it appeared that this message never reached its destination. I did not get any feedback from the system, informing me that there was a problem for submitting my message. Furthermore, I had some problems for selecting an appropriate text that I was going to read (the links were not enough detailed) and for reaching the chosen text on the Internet (links that were unavailable or too slow).

4. *What did you like / dislike in the experience of reading and answering(or posting) messages ?*

The actual fact that I COULD NOT MAKE ANY COMMENTS! ;o)

5. *Was privacy a major issue for deciding whether to participate or not ?*

No, not at all !

6. *What do you think about the use of computers for educational purposes ?*

For children's education, I think that human contact is fundamental. If already they do not see their parents during the whole day and putting them in front of a PC won't do the job. For adults, I think that this can be considered, even be preferred when considering an increased smoothness in the learning process (rhythm and studying hours that are different).

7. *Would you like having on-line courses at your university ?*

If 'Yes', should these on-line courses substitute or complement the traditional courses ?

No, I do not like spending too much time in front of a computer. I prefer studying a course in a syllabus.

8. *Any further comments about the computer conference ?*

No, except that the course subject was too extensive for actually discussing it in an interesting manner (more to my taste). Thus, I sincerely think that this type of education has got a future.

Evaluation questions for the on-line computer conference participants

Answer sheet submitted by: Laurent

on: 2nd of May 1997

1. *Are you a frequent Internet user ?*

Yes !

2. *Did you like to communicate with other people ?*

Yes, it was not too bad ! The fact of getting the possibility to exchange your personal point of view on different topics at the same time It's a structured realization of a forum: it's useful.

3. *Did you encounter any major problems using the Conferencing System*

(Please detail your answer) ?

The users do not by intuition give a title (when replying): conclusion: the whole tree-structure (from the 2nd level on) gets the same name. There's no quick way of finding a particular message (no 'find' function or something similar).

4. *What did you like / dislike in the experience of reading and answering(or posting) messages ?*

The forum aspect: the tree-structure of the forum looks very nice.

This structure is completely defined by the users: it quickly gets 'chaotic': titles of the different topic sections increasingly lose their relation to the topics discussed inside the messages.

5. *Was privacy a major issue for deciding whether to participate or not ?*

No.

6. *What do you think about the use of computers for educational purposes ?*

It's good. It introduces a standardized way of working.

7. *Would you like having on-line courses at your university ?*

If 'Yes', should these on-line courses substitute or complement the traditional courses ?

No. We do not have the necessary 'objectivity' on the subject matter. In addition, on-line courses are restrictive: we would not benefit from all the tools used in live sessions.

8. *Any further comments about the computer conference ?*

/

